THE IRON TRADE REVIEW

Vol. LVII Cleveland, October 14, 1915 *No. 16*

Steel Houses to Shelter Soldiers

And Homeless People of Devasted Regions—Inquiries for Very Large Tonnages—Finished Material Markets Strong

THE building of several hundred thousand portable houses of structural steel and galvanized sheets is proposed by the allied governments and eastern manufacturers are now considering inquiries calling for very large tonnages for this purpose. France alone plans to build 100,000 houses, requiring about a ton each, and the other entente powers are expected to erect a proportionate number. These buildings are to protect the soldiers at the front and also to provide shelter for inhabitants of territory which has been devastated by war.

Iron Ore

Owing to the extremely high rates which have prevailed for the hauling of grain, ore shippers have had difficulty in getting vessel tonnage and it is expected that the season will be prolonged in order to permit the shipment of all the ore which has been sold.

Pig Iron

The pig iron market has continued active in the Chicago district, with prices advancing. In St. Louis, sales have aggregated about 25,000 tons, mostly steel-making irons. In Pittsburgh, buyers are showing much more interest in deliveries for the first half of next year and inquiries for about 20,000 tons of steel-making irons are pending. Low phosphorus iron is steadily advancing. A leading cast iron pipe interest has about decided not to purchase the 15,000 tons of foundry grades for which it has been inquiring, as it considers quotations too high. A wide-spread buying movement for delivery during the first half of 1916 may be expected in the near future.

Shapes and Plates

A Canadian buyer paid several dollers per ton premium for prompt delivery of structural material and the demand in this country shows decided improvement. Railroads are buying more freely. An interesting inquiry for plates is for 50,000 tons for the French government, which, it is understood, are to be used in the protection of trenches. Eastern mills are overwhelmed with orders and prices are stronger throughout the country.

Machinery

Buying of lathes and other equipment for the manufacture of projectiles is limited solely by the ability of sellers to insure delivery. Many inquiries are still being received from Italy, Russia, France and England. There is improvement in the inquiry from eastern railroads for machine tools. Many manufacturers of machinery in eastern territory are building additions to their plants. Strikes of machinists in Cincinnati and Cleveland are causing considerable trouble.

Coke

An eastern Pennsylvania steel company has contracted for 5,000 tons per month of Connellsville furnace coke at $2.25, ovens. A Pittsburgh company is understood to have contracted for 18,000 tons per month for delivery throughout next year. The market for furnace coke is developing considerable strength.

Bars

Eastern Pennsylvania mills have before them from 100,000 to 150,000 tons of bars, wanted for the manufacture of explosive shells, and a large part of this business is about to be placed. The demand for domestic purposes is very heavy. Bar prices are firm and tending upward.

Railroad Buying

The placing of an order for 62,500 tons of rails by the Baltimore & Ohio railroad is expected to be followed by the purchase of 30,000 kegs of spikes by this company and many other railroads will probably be in the market for their requirements at a not far distant date. The Great Northern is inquiring for 30,000 tons. The Southern Pacific has placed 5,000 tons additional with the Tennessee company. The New York Central has placed an order for 1,000 additional hoppers.

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Merger Talk and Facts

TO JUDGE from the headlines and articles these days in the daily press, the conviction appears to have been fixed in the public mind that the steel industry is approaching, if it has not already entered, an era of consolidation rivaling the trust-formation period in the late nineties which culminated in the organization of the United States Steel Corporation.

That there are enough facts in the present situation to make good reading and to stir popular imagination on the dramatic side as to the passing of millions of property behind closed doors, is apparent. But, as yet, nothing has developed that warrants the belief that any greater merger of balanced-off steel companies, as steel companies are accepted to mean to steel men themselves, is in immediate sight or definitely contemplated.

The past week's developments, when an eastern Pennsylvania company of the plate-making class was joined to another steel company as part of a corporation newly formed to make arms and ammunition on a large scale, have shown the closest recent approach to a genuine amalgamation of steel-manufacturing enterprises. This transaction, however, has little resemblance to a steel merger in the strict sense of the term. Apparently, it represents primarily the linking of nearly crude metal capacity with a specialized works which hitherto had been without blast furnaces or steel-making capacity on the large scale necessary to meet the plans of those who have formed the new corporation. Furthermore, the location of the latter plant within the corporate limits of Philadelphia is not favorable for any extensive expansion. In no respect have the Worth Bros. Co. and the Midvale Steel Co. been business competitors, as the products which they have been marketing are quite dissimilar. In this particular, the merger is a peculiar one, fashioned for specific manufacturing quite apart from the regular channels of the steel trade. The fact that a third plant, exclusively an arms and ammunition producer, has been taken over, tends to illustrate the peculiar character of the whole enterprise and makes the acquirement of blast furnaces and a large open hearth plant chiefly the rounding out of a finished manufacturing project where steel is the base metal.

A different situation is shown in the case of some of the other companies which the newspapers insist upon combining forthwith. In many products, those whose names have been mentioned cross in competition. Under its recent policy, the government is not likely to stand by and allow such plans to be carried out if they are, in fact, seriously in contemplation at present. Such a conclusion is warranted by the statement the past week, of Attorney-General Gregory. Until the Supreme Court passes finally and favorably upon the Steel Corporation suit, a matter of a year hence, at least, the promoters of a large steel merger have the all-important legal obstacle before them. This is true in spite of the fact that clearly the trend of decisions of the highest courts is to prevent unfair business methods rather than to restrain consolidations on account of their size or because they bring competing concerns under one management.

It is a matter of observation that there is confidence in high business circles that the right of the Steel Corporation to exist in its present form will be maintained eventually by the final court of the land. Reports of present negotiations toward works combinations, therefore, may represent the clearing up of preliminary details toward that end, awaiting the propitious moment when these enterprises freely may be launched.

Perils of State Regulations

AS THE policy of the interstate commerce commission in regard to the regulation of railroads is developed, while at the same time commissions of many states are taking a hand in the regulation of railroads, it is becoming clear that much embarrassment will be caused unless federal regulation dominates the situation. In a recent address of Alton P. Thom, Washington, D. C., before the State Bar Association of Tennessee, at Chattanooga, the present situation is discussed in a very able and illuminating manner. Mr. Thom points out that if a railroad runs through and serves 11 states, 10 may be guided by broad and liberal views and may be controlled by a policy of encouraging the establishment and maintenance of adequate transportation facilities, but the eleventh may have no adequate commercial outlook, or may be under the domination of small and time-serving politicians and may reduce rates on state traffic so as barely to escape the line of confiscation. Whether the 10 states bow to the will or caprice of the one is the question that confronts the people of all the states interested. Mr. Thom says that in the Shreveport case recently decided by the Supreme Court of the United States, rates have been greatly reduced for the avowed purpose of preserving state markets for state trade and thus excluding and discriminating against the trade of other states.

To permit this policy to continue would be to return to the intolerable conditions described by Fiske in his

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work on the critical period of American history, 1783-1789, when the different states with their various tariff and tonnage acts made commercial war upon each other. Mr. Fiske says that Pennsylvania discriminated against Delaware and New Jersey, Connecticut levied duties on imports from Massachusetts, and the conduct of New York became especially selfish and blameworthy. Connecticut business men voted to suspend all commercial intercourse with New York and every merchant, at a great meeting, signed an agreement, under penalty of $250 for the first offense, not to send any goods whatever into the hated state for 12 months.

In attempts to control the issue of stocks and bonds of interstate carriers, 16 states have enacted statutes, each asserting the power of one state to exercise the right of control. In this way, as well as in regulating rates and in passing other measures, such as full crew statutes, various states may interfere with interstate commerce. Mr. Thom says that the expense put upon the railroads by the full crew statutes of two states would pay the interest at 5 per cent upon the capital fund of more than $34,000,000, an amount which would have bought 1,360 locomotives, or 3,400 steel passenger cars, or 34,000 freight cars, or 1,133,000 tons of steel rails, or would have block-signaled 13,600 miles of road.

We believe that Mr. Thom is right in asserting there must be one master with a harmonious and constructive policy or federal regulation will fail. If it fails, governmental ownership would be the alternative, and then certainly the states would be deprived of all power, but it is earnestly to be hoped that it will never be necessary to resort to government ownership.

No Ground for Fear

STATISTICS show that Germany is manufacturing steel at the rate of about a million tons a month. While some tonnage is shipped to Austria and a very limited amount to other countries, a large percentage of the steel produced in Germany is kept at home. *The Iron and Coal Trades Review* calls attention to this fact, and also to the fact that in 1912, a normal year before the war, Germany produced a total of 17,300,000 tons of steel ingots and castings, of which 6,000,000 tons were exported, leaving, roughly, 11,300,000 tons for home consumption. Our London contemporary expresses the opinion that the German home consumption of steel at the present time is much heavier than it was in the pre-war period and that the tonnage available for home use in Germany is at least double the amount available in Great Britain. *The Review* is not alarmed, because it says that the American steel trade can be drawn upon, but it remarks that it is far from satisfactory to rely upon the good will of a neutral nation, no matter how friendly that nation may be. It points out that the German element of the United States is very strong and says that purchases abroad unquestionably lack the element of stability which would be associated with contracts placed in Great Britain.

All of this is interesting as showing the wonderful productiveness of Germany as compared with other nations, but we believe we can assure our London contemporary that there is not the slightest danger of German influence or anything else interfering with the continued sale of steel products to all customers in England who are able to pay for them.

Personal Touch

THE humane side of industry was referred to in an editorial published in last week's issue of *The Iron Trade Review* and in harmony with the ideas there expressed is an article published elsewhere in this issue on the timekeeper and personal touch. This article is the result of a conversation held recently by two men prominently identified with the iron ore interests of Minnesota. They were talking about the personal equation as it enters into the problem of iron ore mining and one of the two decided to put the views entertained by both on paper. The gentlemen are so modest as not to wish to have their names disclosed, but their observations, based upon long experience, are nevertheless interesting and valuable.

There is, as the article so clearly points out, no doubt that the efficiency of the man depends to a very large extent upon his mental attitude toward the concern with which he is connected, and that means toward the representatives of the company with whom he comes most intimately in contact. While, of course, the timekeeper is one employe who comes in contact with many men, the suggestions made by our friends apply to virtually everybody in the employ of the company. While the timekeeper comes in contact with more men than do most of those whom he meets, every man on the payroll has some contact with his fellows and can help in making life pleasant or disagreeable about a plant or office. If an employe would be popular with his associates and retain his self-respect, he will be courteous and helpful whenever possible. Often a man in a very humble position touches the lives of many other men and can make the world a little brighter for every one of them, if he will only make the effort.

Prices Present and Past

Quotations on leading products October 13, average for September, 1915, average for July, 1915, and average for October, 1914. Prices are those ruling in the largest percentage of sales at the dates named.

	Prices Oct. 13, 1915.	Aver. for Sept., 1915.	Average for July, 1915.	Aver. for Oct., 1914.
Bessemer pig iron, Pittsburgh..	$16.95	$16.80	$14.88	$14.85
Basic pig iron, Pittsburgh.....	15.95	15.65	13.83	13.90
No. 2 Fdy. pig iron, Pittsburgh	15.45	15.45	13.60	13.90
Northern No. 2 Fdy., Chgo....	14.50	13.80	13.00	13.50
Lake Superior Charcoal, Chgo..	16.25	15.95	15.55	13.50
Mall., Bess., Chgo.....	15.00	14.20	13.00	13.50
Southern No. 2, Birmingham...	11.50	11.25	9.60	10.00
Southern Ohio No. 2, Ironton..	14.50	14.25	12.60	13.00
Basic, eastern Pa.....	17.50	15.25	13.75	14.00
No. 2X Virginia furnace.....	13.75	13.25	12.50	12.50
No. 2X foundry, Philadelphia..	16.25	16.00	14.50	14.25
Ferro mang., Balti., (prompt)..	115.00	110.00	100.00	68.00
Bessemer billets, Pbgh.....	25.00	24.60	21.40	21.00
Bess. sheet bars, Pbgh.....	26.00	24.60	21.70	22.00
Op.-h'th sh. bars, Pbgh.....	26.50	25.80	22.00	22.00
Open-hearth billets, Pbgh.....	26.00	25.60	21.50	21.00
Steel bars, Chgo.....	1.59	1.54	1.46	1.30
Steel bars, Pittsburgh.....	1.45	1.34	1.26	1.20
Iron bars, Philadelphia.....	1.45	1.40	1.25	1.15
Iron bars, Cleveland, local del'y.	1.35	1.35	1.20	1.20
Iron bars, Chgo. mill.....	$1.35	$1.31	$1.20	$1.05
Beams, Chicago	1.59	1.54	1.46	1.30
Beams, Pittsburgh	1.45	1.34	1.26	1.20
Beams, Philadelphia	1.559	1.509	1.359	1.25
Tank plates, Pittsburgh.....	1.45	1.32	1.22	1.185
Tank plates, Chicago.....	1.54	1.49	1.39	1.30
Tank plates, Philadelphia.....	1.559	1.509	1.359	1.25
Sheets, blk., No. 28, Pbgh.....	2.00	1.92	1.77	1.95
Sheets, blue an., No. 10, Pbgh.	1.60	1.52	1.35	1.40
Sh., galv., No. 28, Pbgh.....	3.50	3.67	4.55	2.95
Wire nails, Pittsburgh.....	1.75	1.69	1.59	1.59
Connellsville fur. coke contr...	2.25	1.84	1.67	1.75
Connellsville fdy. coke, contr...	2.70	2.37	2.75	2.35
Heavy melting steel, Pbgh.....	14.00	14.25	11.75	11.44
Heavy melting steel, east'n Pa.	15.00	15.00	12.00	9.75
Heavy melting steel, Chgo.....	11.50	12.00	10.15	9.00
No. 1 wrought eastern Pa.....	16.00	16.00	13.25	11.50
No. 1 wrought, Chgo.....	10.75	10.75	8.90	7.75
Rerolling rails, Chgo.....	13.50	13.15	10.00	10.00
Car wheels, Chgo.....	11.75	11.75	10.30	10.50

(For Additional Prices See Page 764.)

Low Phos Pig Iron Still Climbing

Quotations Moved Up Rapidly—Basic Sold at St. Louis—
Foundry Grades in Most Centers Quiet

Philadelphia, Oct. 11.—Chief activity in the eastern Pennsylvania pig iron market has remained in the steel-making grades with low phosphorus still the feature. Lebanon district makers now have joined in the sharp advance which was noted a week ago in standard low phosphorus. This grade in that district in the week starting at $20.50 furnace sold up to $24 furnace and now is held near the top. One Lebanon maker sold about 9,000 tons in the week for shipment following Jan. 1. Standard low phosphorus now is quoted at 26 to 27, Philadelphia basis. Sales have been lighter, mainly because makers are so sold up they are obliged to avoid new business. Canadian buyers remain well to the front in this movement. The Canadian Steel Foundries, Ltd., has been a buyer of 7,000 tons recently and has inquired for 5,000 tons additional on which it was quoted $25 furnace. In basic, a Trenton, N. J., steel maker brought 6,000 tons for first quarter from one eastern Pennsylvania maker at $17.50 delivered and is reported to have placed an equal or a larger tonnage with another nearby producer at about $17.75 delivered, or $17.50 at the furnace. A Williamsport, Pa., buyer purchased 1,000 tons of early basic at about $17.50 delivered. Another sale of 1,500 tons of eastern Pennsylvania basic for early shipment was closed. The Thomas Iron Co. is to resume the making of basic after having not been a seller of this grade for several years. Its No. 10 Hellertown furnace, which is about to resume, will make this grade for the market. Foundry iron sales continue relatively small, as consumers seem well covered for this year and are feeling their way before closing for distant deliveries. Prices in eastern Pennsylvania are unchanged and in Virginia now are at a minimum of $13.75 furnace for No. 2 for this year. A Virginia buyer has inquired for 1,000 tons. The Standard Cast Iron Pipe & Foundry Co. has practically decided not to buy the 15,000 tons of Nos. 2 plain and 3 for which it recently inquired, owing to the prices named. Other pipe makers are doing little, but all are receptive buyers at a price. A local buyer asks 400 tons of prompt malleable. September statistics from eastern Pennsylvania furnaces reported to the Eastern Pig Iron Association showed little change either in stocks or orders. Production, however, was larger, as two furnaces resumed in the month. In Virginia there was an increase in both stocks and orders of 10,000 to 15,000 tons, while three additional furnaces went in.

Market is Strong

New York, Oct. 12.—Scattered buying still keeps down the volume of pig iron sales in the metropolitan zone. The market, however, manifests steady strength and the disposition of makers to hold firmly for higher prices for forward deliveries is continued. A quotation of $18, eastern Pennsylvania furnace, for No. 2X for shipment after Jan. 1 is noted and a leading maker has quoted its present schedule as $17.50, furnace, for No. 2X for that period. These prices are considerably beyond the average, however, as eastern Pennsylvania iron is offered at $15.50, furnace, for this year, and at $16.50 for next year. Some central Pennsylvania makers want $16, furnace, for first quarter. Buffalo prices seem firmer at $15.50 for No. 2X for last quarter and at $16 for beyond. The tidewater market for No. 2X remains about $16.25 to $16.75 for the rest of the year and at $17.25 to $17.75 for first half. Up-

(For complete prices see page 764.)

state buyers have been taking some fair lots. A railroad equipment shop near Buffalo closed for 3,000 to 5,000 tons of malleable for last half, presumably with Buffalo makers. A central New York steelmaker has asked for 3,000 tons of special basic for forward delivery. A soil pipe maker who was asking 2,000 to 4,000 tons of foundry grades for Newark, N. J., and Medina, N. Y., is understood to have placed this business. A Newburg, N. Y., buyer took about 500 tons of foundry. Recent purchases of Ohio lower silicon iron by a New Jersey pipe maker are understood to have been increased to about 6,000 tons. A somewhat special sale of 1,000 tons of Alabama No. 2 soft for early shipment was made in this territory at $12.25, Birmingham. High freights still hold up the closing of the numerous lots of iron for export now pending. The rates continue to rise and to Italian ports 65 to 70 shillings was quoted in the week. The Canadian Steel Foundries, Ltd., has inquired for 5,000 tons of standard low phosphorus.

Interest Taken in 1916 Iron

Pittsburgh, Oct. 12.—Several consumers have opened negotiations for first and second quarter pig iron. One melter wants 10,000 tons of bessemer iron for shipment the first half of next year; the West Penn Steel Co. is inquiring for 10,000 tons of basic for first quarter delivery; negotiations have been opened by a foundry interest for 1,500 tons of bessemer iron for delivery the first three months of the year and a basic iron melter in the immediate district is asking bids on from 3,000 to 5,000 tons for delivery the remainder of the year. Dealers are asking $15.50, valley, for basic iron for shipment this year, but are refusing to quote on either basic or bessemer tonnages for shipment after Dec. 31.

Demand for foundry grades is fairly heavy and indications are that the prevailing minimum price of $14.50, valley, soon will disappear. A large number of smelters already have ordered some pig iron, purchased for first quarter delivery and a large number of melters have taken all the iron involved in contracts calling for delivery this year.

Reports that the Midvale Steel & Ordnance Co. had obtained a large tonnage of Lake Superior iron ore for its furnaces at Coatesville, Pa., are unfounded. The company, it is reliably stated, will use Cuban ore. Ore dealers here say lake shipments this season would exceed those of any previous year in the history of the trade, were it not for the fact that vessel capacity has been engaged by grain shippers.

Moderate Sales

Cleveland, Oct. 12.—One Cleveland agency during the past week has sold about 10,000 tons of various grades of pig iron at Toledo and Erie, mostly for delivery during the first quarter of next year. Other sellers have disposed of moderate tonnages. The market is not active, but leading sellers would not be at all surprised to see a strong buying movement the latter part of this month. Prices are firm and deliveries on contract are going forward freely.

Chicago Prices Higher

Chicago, Oct. 12.—Prices on northern No. 2 foundry and malleable pig iron in Chicago have been advanced materially and a further rise is predicted for the near future. One seller has fixed his quotation at $15.50, Chicago furnace, for last quarter and first quarter delivery. Should much business be booked at these figures, a further advance will follow immediately. Another seller is still selling some foundry at $14.50, furnace, for immediate delivery.

These figures bring the northern market to a better position relative to other producing centers after Chicago iron has dragged for many months at about $1 below its usual relative level. Present strength is due to a number of factors. Better selling has been met during the past two months than has been experienced for several years. Furnaces now active have sold practically their entire make for the next six months and shipments now are greater than production. Furnace yards contain small supplies of iron, most of which is misfit, which can be disposed of only when a buyer desires that particular analysis. Large inquiry is present, at least 15,000 being active, mostly for foundry iron, in lots from 2,500 tons to 100 tons. Numerous inquiries of the latter size or slightly larger have been received from small foundrymen and this is a strong indication of the revival of general domestic business.

Many buyers who covered for last and first quarter find their necessities such that they are anticipating shipments, and in some cases have asked their entire last quarter tonnage for the present month. Many also have asked that their tonnage for first quarter be increased largely.

The ore situation is causing considerable anxiety. Some furnacemen find they have not sufficient ore on docks to supply their furnaces during the winter and the present situation on the lakes is such that it is almost impossible to obtain tonnage to add to their stocks. High prices for carrying grain from the head of the lakes has absorbed all available tonnage and some ore contracts have been repudiated that ship owners may participate in the heavy profits from moving grain. The situation is regarded as acute and may be a factor in preventing additional furnaces from going into blast.

Southern iron is not active in this market and comparatively little business is being done. It is believed $11.50, Birmingham, cannot now be done for present quarter and $12.50 for first quarter is said to be less easily obtained than formerly.

Large Sales at St. Louis

St. Louis, Oct. 12.—Upwards of 25,000 tons of pig iron changed hands in this territory last week, giving an air of real industry to the trade. Sales closed, most of them on Friday, included 10,000 tons of basic, 2,000 tons of malleable, 500 tons of southern No. 2, 400 tons of northern, and quite a sprinkling of small orders.

There is no inquiry of consequence on the market, but local sales agents are inclined to the belief that a buying movement has started, and that some good business will develop. Southern No. 2 is held at $12.50 for the remainder of the year, and $13 for first quarter delivery, Birmingham basis. Northern iron is quoted at $14.50, Chicago, for remainder of the year, and $15, f. o. b. Ironton.

Inquiry for 30,000 Tons

Buffalo, Oct. 12.—In the face of Buffalo furnaces being almost completely sold up over the remainder of the year, an influx of inquiries aggregating 30,000 tons has developed during the week. From a third to a half of this total has been booked for tonnages of foundry grades, malleable and basic. Of the latter line from 2,500 to 3,000 tons was sold for first quarter delivery at $16.50 at the furnace.

The inquiry noted is for the first quarter of 1916 needs. The range of prices on the various grades from gray forge and No. 3 foundry to the foundry grade carrying 4 to 5 per cent silicon is firmly established at $15.50 to $17. In fact, the producers are not readily taking on tonnages for first quarter deliveries at existing prices. They are holding sales down to April 1 deliveries and show no disposition to book business extending over the first half of the coming year.

The attitude of the furnace inter-

(*For complete prices see page* 764.)

ests is said to be based on the increase in the price of coke for first quarter and the looked for higher price of ore due to the upward pressure of the carrying charge from the mines up the lakes to the furnaces here. The demand for boats to carry grain down the lakes has caused the equivalent charge for carrying ore to advance from the contract price basis of 40 cents per ton to a point where vessel owners are refusing to accept cargoes of ore at proffered prices of $1 and as high as $1.50 per ton. An offer of the latter price to carry ore from the mines to a Canadian furnace at Sarnia, Ont., has just been declined.

Pig Iron Slow

Cincinnati, Oct. 12.—Developments during the past few days show that a small amount of southern furnace iron is being offered at $11.50, Birmingham basis, for No. 2 foundry, for prompt delivery. The majority of stacks in the south are firm at $12, Birmingham basis, for the last quarter, and at from $12 to $12.50 for the first quarter of next year. Although from 75,000 to 100,000 tons of resale iron is in the hands of speculators in this territory, it has not been moving, and only occasional small lots are being sold at from $11.50 to $12, Birmingham basis. Melters are well covered for this year, and are refusing to pay $12.50 for first quarter iron, with the result that transactions are very low and inquiries scarce. Southern Ohio No. 2 foundry iron is quoted at $14.50, Ironton basis, for this year's shipment, and at $15 for the first half of 1916. No basic iron is available for the last quarter, and it is strong at from $15 to $15.50, furnace, for the first half. Silvery iron is quoted at from $18 to $18.50, furnace, for 8 per cent silicon. Inquiries include 1,000 tons of bessemer iron from Detroit, Mich., 500 tons of southern iron from a northern Ohio melter, 600 tons from an Indiana user, and 400 tons of analysis iron from a St. Louis manufacturer.

Satisfied With Lull

Youngstown, O., Oct. 12.—Inquiry for foundry pig iron has shown a little improvement this month over September, but slow compared with August. Valley sellers are booked well ahead and seem satisfied with the present lull. No. 2 foundry has been placed at $15, valley, by nearly all sellers, for both this quarter and for the first quarter of next year, but the $14.50 price does not seem to have disappeared entirely. Steelmaking grades have maintained their strength in respect to prices, although new business is rather slack at present. Sellers say the bessemer iron market is firm at $16, valley, although indefinite reports of sales at from $16.10 to $16.50 are heard. Basic is firm at $15, valley. Developments in this grade are expected before long.

Ore Shippers

Have Strong Competition From Shippers of Grain

Although grain rates have receded temporarily to about 5 cents, the excitement of vessel owners has not subsided. Every possible scrap of vessel tonnage is being placed into commission. The resurrection of the WALDO is a case in point. If this vessel can be promptly put into commission, she will almost pay her purchase price and cost of repairs before the season is over. The light fleecy summer seas have gone and are replaced by heavy waters, which make deep loading imprudent and have caused vessel owners to issue instructions to allow a foot or so more freeboard. Moreover, stages of water are falling and these factors cut considerably into tonnage capacity. The cargoes of the larger class of carriers will work out about 200 tons per trip less. In addition, fog, heavy weather and strandings in the narrow channels owing to low water are seriously delaying the fleet. All these conditions make for greater firmness in the market because they all mean a subtraction of available tonnage. Business from now on will be of great pressure, as all three trades, ore, coal and grain, are clamoring for tonnage. There is little likelihood of any ore being moved at rates in excess of contract rates. A few cargoes will probably pay heavy premiums, but this will have no influence whatever upon the general market. Concluding trips in coal will of course be made at fancy rates and in all probability the closing rates on grain will be such as the trade has not experienced in a quarter of a century and in fact it may be another quarter of a century before they are equalled again.

Increased Eastern Shipments

New York, Oct. 12.—Increased blast furnace operations have brought about a heavy movement of iron ore from eastern mines. In the Port Henry district, shipments and production during September were the heaviest in several years. Some large buyers are endeavoring to arrange for eastern ores for shipment well into next year, but sellers are reluctant to close contracts as yet, as they have not yet formulated their ideas of advances for extended delivery. A leading eastern Pennsylvania steelmaker recently closed for a fair-sized tonnage of off-grade bessemer ores from the Port Henry district. Cuban ore shipments for the current year are much below those of other recent similar periods. This is due primarily to the difficulty of obtaining boats at reasonable rates of freight. The leading Cuban producer is not expected this year to bring in much over 400,000 tons, which is less than one-half the tonnage shipped in recent years.

(For complete prices see page 764.)

Lake Erie Ore Receipts

Out of a total movement of 7,863,146 tons of iron ore during September, 6,650,976 tons were received at Lake Erie ports, distributed as follows:

Port.	Gross tons.
Buffalo	1,012,169
Port Colborne, Ont.	51,519
Erie	149,917
Conneaut	1,257,147
Ashtabula	1,478,179
Fairport	312,354
Cleveland	1,279,449
Lorain	617,467
Huron	128,135
Toledo	273,413
Detroit	91,227
Total	6,650,976

Record Grain Cargo

The record grain cargo of the Great Lakes recently was unloaded at Buffalo. It was 670,670 bushels of wheat, which was carried by the American steamer W. P. SNYDER JR., owned by the Shenango Steamship Co., Cleveland. The cargo said to equal the crop of a solid wheat field covering about 40 square miles.

The monthly report of the Lake Superior Iron Ore Association shows that shipments from dock during September amounted to 4,417,430 tons and that the balance on dock Oct. 1 was 7,985,986 tons, compared with 7,765,119 tons. on dock Oct. 1, 1914.

The new by-product coke ovens of the Republic Iron & Steel Co., Youngstown, will be completed not later than Nov. 1. The new battery consists of 75 Koppers ovens, the completion of which will give the company a total of 143 ovens.

J. W. Burdick, president of the West Penn Steel Co., Brackenridge, Pa., has been appointed one of the directors of the Chicago, Rock Island & Pacific railway. Mr. Burdick, and six other directors, were selected by the two stockholders' protective committees.

Needs Plates for Trenches

Novel Inquiry Received From French Government for 50,000 Tons—Mills Crowded With Orders

Philadelphia, Oct. 11.—An inquiry for 50,000 tons of 10 to 12-millimeter or 1/3-inch plates for the French government has been received by eastern Pennsylvania makers. It is understood this steel is to be used as a protective covering in the trenches. Heavy orders for this year's delivery, with increasing pressure from buyers for contracts from Jan. 1, continues to represent the eastern Pennsylvania plate situation. With some makers the demand is so expansive that it exceeds production in the ratio of three to one with the result that considerable business is forced to be rejected. One important mill has more pressing tonnage specified than ever before in history. Eastern makers have not yet quoted for first quarter, but the requests are so insistent that they may be obliged to do so soon. It is not likely that below 1.50c, Pittsburgh, will be named for first quarter and with some mills it may be higher. Eastern and Pittsburgh mills will furnish 4,000 to 5,000 tons of plates for the two Ward line boats placed last week with the Cramp yard. Another eastern builder is understood to have closed a further vessel contract. The Reading railroad has placed two car floats with a Camden builder. The Norfolk & Western asks 1,000 tons of plates for first half shop needs and the Pennsylvania railroad is out for a tonnage for similar purposes.

Show Strength

Pittsburgh, Oct. 12.—Steel plates, which showed irregularity the first seven months of the year, rapidly are gaining in strength. Some mills are asking 1.45c and 1.50c and some tonnage for first quarter delivery has been sold at the latter figure. Specifications are coming out in increased volume and inquiries are numerous. Interest manifested by car builders leads to the belief that an active car buying movement soon will be inaugurated. Steel plates are quotable at a spread from 1.40c to 1.45c.

Market is Strong

Cleveland, Oct. 12.—Eastern mills are quoting 1.50c, Pittsburgh, and the only inducement held out is delivery in from four to six weeks on universal plates. At local plants, 1.45c, Pittsburgh, is the minimum. Although the plate market is strong, many boilermakers and other users of plates are not extremely busy.

Plates Gain Strength

Chicago, Oct. 12.—Steel plates have assumed a position almost equal to bars and shapes. For the most part, plates can be obtained at 1.59c, Chicago mill, although limited tonnages of narrow sizes will be taken by small producers at $1 per ton less. Increased car buying and heavy demand on eastern mills for ship building and other purposes have strengthened the market materially and thrown considerable demand from the middle west onto Chicago mills, making up for whatever slack condition might exist in the west.

Billets Higher

On Account of Very Active Demand for Shell Making

Philadelphia, Oct. 11.—Shell making steadily is calling for large tonnages of semi-finished steel, mainly billets and blooms, in the district. A Chester, Pa., buyer has asked for about 60,000 tons of 10-inch billets for extended delivery upon which some makers have been unable to quote. Another inquiry calls for 3,000 tons of 3 to 4-inch billets monthly for an indefinite period for shipment to France. Other inquiries are numerous. Prices on the semi-finished steel to fill shell requirements remain on a very high plane. A quotation of $55 eastern Pennsylvania mill for forging steel was made in one case during the week. Regular consumers of billets are having trouble both to get sufficient supplies and have enough prices to enable them to finish products for the market, since the shell steel demand is offering the mills very lucrative returns on rerolling billets. Current prices on small sales are about $28 to $30, Philadelphia, for open hearth Several hundred tons of western bessemer steel were sold at $27 delivered, this territory. An export inquiry for 12-inch sheet bars is current.

Strong at Pittsburgh

Pittsburgh, Oct. 12.—Some interest is manifested in the semi-finished steel market for first quarter delivery, but no trace of sales for shipment after Dec. 31 can be found. Absence of buying in the open market makes it difficult to quote prices accurately, but prevailing quotations appear to be representative. Wire rods are firm at $30, Pittsburgh.

(*For complete prices see page 764.*)

English Ferro

Being Offered More Freely at $100—Some Recent Contracts

New York, Oct. 12.—Freer offering at $100, seaboard, of English ferro-manganese for shipment by the close of the year or later, as the makers may be able to obtain licenses from the government, has brought about some increase in the volume of sales of this alloy. Recent contracts placed for shipment this year and first half have totaled at least 5,000 tons. Inquiry is better. An Ohio consumer is figuring on about 500 tons. At least three or four agents of English makers now are offering to take on additional lots of limited size for the year at $100, seaboard, subject to the usual restrictions. The number of these sellers was increased further during the week by authority to sell being received by certain houses which up to this time have been out of the market.

Prompt carloads where consumers pressing needs continue to command $110 to $115, seaboard.

Alloys Scarce

Pittsburgh, Oct. 12.—Eighty per cent ferro-manganese is being quoted at $110, seaboard, by most dealers. No trace of quotations below that figure can be found. Demand for ferro-manganese and other ferro-alloys and steel-making metals continues heavy. It is not unlikely that 50 per cent ferro-manganese will be advanced about $10 a ton before the opening of next year. Abnormally high prices prevail for all steel-making metals, which are scarce.

Wire Advance Expected

Pittsburgh, Oct. 12.—Insistent demand for wire products for domestic and foreign shipment continues to feature the market. Prevailing prices are decidedly strong and it is not improbable that quotations will be put up $1 or $2 a ton the next two or three weeks. Manufacturers are not soliciting orders and all unspecified contracts are being cancelled. Shipments of barb wire to England and western Europe are decidedly heavy.

Indiana Brass Co., Frankfort, Ind., has increased its capital stock from $25,000 to $50,000.

Sheet Prices Advancing

Extraordinary Demand for Blue Annealed—Semi-Finished Situation an Important Factor

Youngstown, O., Oct. 12.—Demand for galvanized sheets is described by valley makers as being about 60 to 70 per cent of normal; for black sheets as normal, and for blue annealed sheets as extraordinary. Galvanized sheet prices have shown a tendency to stiffen recently, but the lower prices for spelter which have developed this week are constraining galvanizers to hesitate before changing their selling policy. Some of the leading sellers are holding for 3.80c for No. 28 gage, Pittsburgh, but quotations range all the way from 3.50c up.

The semi-finished steel situation is steadily becoming a more important factor in the present sheet market, in several respects. The shortage of open hearth steel is establishing a growing market distinction between open hearth and bessemer sheets. In another way the heavy demand for open hearth steel is affecting the sheet market. Important producers of semi-finished steel and sheets are not figuring in the sheet market as prominently as normally, which puts the smaller independents in a better position.

The unusual conditions in sheets have upset price relationship as between gages. Galvanizers are asking more for the light gages of sheets than for the heavy gages, because of the greater amount of spelter required per ton in the former. Likewise, sellers of open hearth box annealed sheets are asking on the basis of 2.10c for lighter gages and 2c to 2.05c for heavy gages. Bessemer black sheets are firm at 2c, Pittsburgh base, for No. 28 gage. Some sellers of open hearth black sheets are asking on the basis of 2.10c for all gages, and sales for prompt shipment have been made at that figure.

The heavy demand for blue annealed sheets, coupled with the comparatively small capacity devoted to this line of work has upset the parity between prices for this description and for black sheets. Selling at 1.60c, blue annealed sheets are on a parity with black sheets at 2.10c. But the former prices are firming up rapidly. Sales for prompt shipment of fair tonnages have been made at 1.70c and the market ranges from 1.60c to 1.70c for No. 10 gage, Pittsburgh base. Export business has been an important factor in the blue annealed market as well as in black sheets. Heavy shipments have been made both to belligerents and neutrals. The most noteworthy of these shipments recently have been to Greece and South Africa. Orders for blue annealed sheets have called for odd sizes and all gages, leaving valley producers mystified as to their ultimate destination.

Demand Increases

Pittsburgh, Oct. 12.—Deliveries of steel sheet products, except galvanized material, are deferred from six to 10 weeks. Galvanized products are offered for quick delivery. Demand for black and blue annealed sheets is heavier and prices appear to be hardening. The American Sheet & Tin Plate Co. is operating its sheet mills at approximately 80 per cent of capacity. As mills begin to roll material from higher-priced sheet bars, quotations for finished products probably will advance gradually.

Higher Prices

Cleveland, Oct. 12.—The demand for sheets is active and prices have again advanced to a basis of 1.65c to 1,70c for No. 10 blue annealed and 2.10c for No. 28 black. The high price of sheet bars is an important factor in the market.

Sheets are Stronger

Chicago, Oct. 12.—No. 28 gage black sheets are quoted at 2.19c, Chicago mill, but makers are not anxious to load up with large tonnage at this price, as it is out of line with the selling price of sheet bars. Demand for billets and prices obtainable for this form of semi-finished steel have increased the price on sheet bars to a point where quotations on black sheets must be increased for the sheet maker to obtain legitimate profit. Advances are expected at any time.

Galvanized sheets are quoted at 3.69c to 4.19c, Chicago, according to the ideas of various makers and depending on the spelter market. The leading independent in Chicago consistently refuses to enter the market under the present circumstances.

Stronger at Cincinnati

Cincinnati, Oct. 12.—Black sheets are stronger, and are now quoted at from 2.05c to 2.10c, Pittsburgh basis for No. 28 gage for prompt shipment. Mills are not quoting for future delivery. The large demand for billets and sheet bars from the east is the chief cause of the gradual stiffening in prices on black sheets. Galvanized sheets No. 28 gage are quoted at from 3.65c to 3.75c, Pittsburgh basis, being unchanged from last week. Prompt business is good, and shows a slight increase over the corresponding period last month.

Tin Plate Probably Will Advance

Pittsburgh, Oct. 12.—The tin plate market is expected to mark time until buying for next year begins. Mills are not yet willing to open order books and it probably will be a fortnight or longer before the price for 1916 delivery is announced. That it will be considerably above the price offered at the opening of the present season, generally is conceded.

(For complete prices see page 764.)

Steel Pipe Quiet

Pittsburgh, Oct. 12.—The United Natural Gas Co., which recently completed a 20-inch gas line in western Pennsylvania, is reported to be considering the laying of a 20-inch line from Louis Run, Pa., to Niagara Falls, a distance of about 70 miles. No large orders for pipe have been placed this week in the open market. Demand for boiler tubes is rather heavy and prevailing prices are firm. Seamless tube mills are unable to promise material in less than five or six months, in many instances.

Chain Advanced

Pittsburgh, Oct. 12.—Leading makers of steel chain have advanced prices about $3 a ton and now are quoting 3.05c for proof coil chain, ⅜-inch thick. The market until about a fortnight ago was decidedly quiet. Were it not for the fact that some manufacturers had accepted contracts for war material, plants manufacturing chains in this district would have been practically idle the last six months.

Nuts, Bolts and Rivets

Pittsburgh, Oct. 12.—Nut, bolt and rivet makers are enjoying considerable activity, although many of them are operating only on single turns. Demand for all three products for shipment abroad is heavy. Prevailing quotations are described as firm.

A replica of the Globe Furnace Co. plant at Jackson, O., was one of the most interesting exhibits at a fall festival held at Jackson. The miniature plant was built on a scale of one-half inch to the foot.

Coke Stronger

Buying of Connellsville Furnace Grades Heavy

Pittsburgh, Oct. 12. — Connellsville furnace coke reflects strength. Buying for first and second quarter delivery has been heavy, it being estimated that 50 per cent of existing contracts have been rewritten. Some 1916 coke has been sold at a flat price of $2.25, ovens, for 12 months' delivery, but the bulk of the tonnage for delivery after Dec. 31 has been obtained on sliding scale contracts, which offer from $2 to $2.25, ovens, when basic pig iron is commanding from $15 to $15.50, valley. The Pittsburgh Steel Co. is understood to have closed negotiations for about 18,000 tons of furnace coke a month for next year. One of the two stacks of that company is under cover until next July. Spot furnace coke is commanding $1.80, ovens, and above and dealers are asking $2.25, ovens, for shipment the remainder of the year. Foundry coke is firmly held at prevailing prices. *The Connellsville Courier* for the week ending Oct. 2 says production was 397,589 tons, an increase of 6,705 tons over the previous week. During the first, second and third quarters of the year, the Connellsville district produced 12,300,358 tons. The H. C. Frick Coke Co. increased its active ovens list by 533 ovens last week.

Eastern Consumer Closes

Philadelphia, Oct. 11.—An eastern Pennsylvania steel company has purchased 5,000 tons of Connellsville furnace coke monthly for first half at $2.25 ovens. Reports of increasing labor shortages in the western Pennsylvania coke districts have reached this territory and consumers of foundry coke especially are being warned that the situation may lead to serious curtailment of output. Makers are carefully scrutinizing sales to see that there is no overbuying.

At a Standstill

St. Louis, Oct. 12.—Coke is at a standstill, with no business in sight. New River coke is held at $3.25, and Virginia and Connellsville foundry grades at $2.50 to $2.75.

Steady at Cincinnati

Cincinnati, Oct. 12.—The coke market is quiet and without feature as far as new business is concerned. Shipments to both furnaces and foundries on old contracts are very heavy, and show a slight increase over the corresponding week last month. A southern Ohio furnace has been inquiring for first half requirements, but has not taken any definite steps towards buying. Nothing is pending in foundry coke. Prices are unchanged in the Wise County, Pocahontas and New River districts.

Steel Lettings

Show a Decline in September—Elevated Road Tonnage

New York, Oct. 12.—A decline of about 30,000 tons was represented in the total structural steel lettings in the country during the month of September according to the statistics of the Bridge Builders and Structural Society. The awards last month amounted to 67 per cent of the total capacity of the country or about 115,000 tons compared with 85 per cent and about 146,000 tons in August.

The monthly reports of the Bridge Builders and Structural Society showing the percentage of capacity booked and the approximate tonnage are as follows:

Month.	Per cent.	Approx. tonnage.
September, 1915	67	115,000
August	85	146,000
July	86	148,000
June	80	138,000
May	61	105,000
April	62½	107,500
March	64	110,000
February	30	51,000
January	25	43,000
December, 1914	35	60,000
November	20	35,000
October	35	60,000
September	38½	65,000
August	27½	48,000
July	68	115,000
June	56½	95,000
May	57	97,000
April	88	151,000
March	76	130,000

In point of size the principal development of the week was the bidding upon 63,000 tons of elevated railroad construction in Brooklyn, on which the American Bridge Co. submitted the lowest figure, averaging between $40 to $45 per ton delivered.

More Ferro Arrives

New York, Oct. 12.—The steamer ANNAPOLIS has arrived at Baltimore with 1,500 to 2,000 tons of English ferro-manganese, consigned to two agents of the makers in this country. This is one of the largest single shipments to come in since licenses were held up several months ago. Practically all the metal in this cargo will be applied on old contracts of consumers which have been merged with additional tonnage at the ruling market, and little of it is available for sale. Other arrivals under October licenses are expected before many days.

John F. Wade has resigned as superintendent of the New Departure Mfg. Co., Bristol, Conn.

(For complete prices see page 764.)

Cast Iron Pipe

Prospect for Spring Buying Favorable—Dull at Present

New York, Oct. 12.—Prospects for spring buying of cast iron pipe are pronounced by makers to be promising, but the current market is not very active. This is due to the fact that the off-season now is at hand for public lettings and few offerings of this kind are appearing. New York City departments took bids the past week from contractors on 400 tons of 6's to 12's. Private buyers are placing some fair lots for early delivery, but are not yet closing at the advanced prices asked by the shops for shipment after Jan. 1. Prices hold up very well. Some makers are quoting on the basis of $25.50, New York, for 6-inch, class B, with $2 more for the smaller diameters. The range of the market appears to be about $24.50 to $25.50, New York, for 6-inch and $27.50 to $28 for 4-inch. Eastern foundries are enjoying fair but not capacity operations.

Cleveland Takes More

Cleveland, Oct. 12. — The water works department of the City of Cleveland, when it made a contract for pipe some time ago with the U. S. Cast Iron Pipe & Foundry Co., made an agreement with the company that the latter would allow the city to make additional purchases up to $40,000. The company's bid on 6-inch to 48-inch was $23.75, delivered on the city's streets. The city has now decided to exercise its option and will take pipe up to the value of $40,000.

Cast Pipe Advanced

Chicago, Oct. 12.—Cast iron pipe has been advanced $1 per ton on the Chicago market and is now quoted at $28 per ton for 4-inch and $26 per ton for 6-inch and larger.

Not much activity is present in the market, although larger cities are beginning to try the market in preparation for issuing their specifications for next year's activity. The only large letting now in prospect is 2,000 tons for Cincinnati, bids on which will be opened Oct. 13. Figures will be taken Oct. 14 at Attica, Kans., on 220 tons and Oct. 12 at Russell, Kans., on 322 tons.

The United States Cast Iron Pipe & Foundry Co. has been awarded 146 tons at Hamilton, O., and the American Cast Iron Pipe Co. has taken 350 tons at Sydney, Ia.

Willis L. Brownell has retired as treasurer of the Crocker-Wheeler Co., Ampere, N. J.

Big Bar Tonnage Pending

And Large Orders Are About to be Placed—Prices Are Being Advanced—Railroads in Market

Philadelphia, Oct. 11. — Eastern Pennsylvania steel makers, it is estimated, now have before them inquiries calling for 100,000 to 150,000 tons of large rounds, blooms, etc., for shell use, much of which is on the verge of closing. These lots are both for direct export and for domestic ammunition manufacturers. One inquiry calls for 42,000 tons of rounds; others run from 5,000 tons upward. The sizes are chiefly for the heavy explosive shells and range from 6 to 11 inches. A lot of 14,000 tons which has been up, has been discontinued. No important additional sales have been made in this district, but makers expect quick action on some of the pending negotiations. The Baldwin Locomotive Works has bought 1,000 tons additional. The enormous demand for shell stock is causing makers to tighten up on prices. Some mills now hold for 3.00c mill as minimum. Ordinary bar buyers in this district in increasing numbers are asking the mills to cover them on contract after Jan. 1. Most of the producers, however, seem in no hurry to take on the business, especially on blanket contracts, and several of them are declining to quote. Others have done 1.40c, Pittsburgh, or 1.559c, Philadelphia, in some cases. The railroads are among the inquirers. The Norfolk & Western asks 3,000 tons for first half and the Pennsylvania is out for a round tonnage. The Baltimore & Ohio is about to come out. Shafting is holding firmly at 60 off. One buyer closed 650 tons on this basis.

Heavy War Business

New York, Oct. 12.—Most of the inquiries for shell steel now in the market call for rounds and blooms for projectiles of 6-inch and greater diameter. J. P. Morgan & Co. continue to place large lots of rounds for export shipment and one lot of this kind in the week called for 5,000 to 10,000 tons of 11-inch rounds. Buyers of shell stock are encountering increasing difficulty in getting satisfactory deliveries in all cases because of the heavy tonnages now on mill books. In some cases, producers are promising four to five months' shipments on large rounds and in view of this fact they have been obliged to decline to quote on some additional business. A Brooklyn manufacturer of shells who recently asked for 17,000 tons of 3½-inch rounds, still is figuring on a part of this lot. Pending inquiries for shell steel for domestic manufacturers now pending in this district total about 100,000 tons with a heavy tonnage additional for direct export.

Steel Bars Strongest on List

Pittsburgh, Oct. 12.—The pressure for steel bars is tremendous. Specifications are coming out in heavy volume from all directions. Demand for rounds of large diameter for the manufacture of war material continues heavy and domestic consumers are playing a more important part in the market each week. Forging, shafting and automobile interests are specifying heavily and nut, bolt and rivet manufacturers are urging shipments. Deliveries are deferred three months and more with some interests. Despite the backward tendency of the bar iron market in some districts, mills in western Pennsylvania are enjoying fairly remunerative prices; some makers are refusing to shade 1.50c.

Steel Bars Scarce

Chicago, Oct. 12.—Steel mills in the west are pausing to take stock of their present engagements and the opinion is growing that present tonnages on books in all likelihood will absorb the output well into first quarter, if not entirely through that period. Some inquiry is being received for contracts through first quarter and first half, but not much is being sold until mills find where they stand for tonnage during that period.

No steel bars are available for delivery at less than 1.59c, Chicago mill, and under the present situation it appears likely this price will cover practically all steel rolled and delivered to April 1 of next year. Whether quotations will be set at a higher price is immaterial, if no steel is actually for sale.

Demand for steel bars for consumption in the west is not strong and users who have not covered will find themselves unable to obtain supplies from mills for some months.

Bar Iron Demand Less

Chicago, Oct. 12.—Although quotations on bar iron remain steady at 1.35c, Chicago mill, demand for this product is somewhat less and a large producer whose mill has been operated at capacity for the past two months finds its specifications at present not sufficient to insure operations through the present week. Other makers who have not been so fortunately situated are operating at correspondingly reduced scale.

Increased demand is expected to make its appearance by the middle of this month, when the active season of many users will begin.

(*For complete prices see page* 764.)

Would Increase Tonnages

Cleveland, Oct. 12.—The demand for steel bars continues very strong and important users are anxious to largely increase their tonnages under contract. Prices range from 1.40c to 1.50c for delivery through the first quarter. Rerolled bars are finding an active market at 1.35c.

Out of the Market

Buffalo, Oct. 12.—Two or three of the largest interests operating in the Buffalo territory are practically out of the market for bars and other finished materials for the remainder of the year. One of the leading independent mills is declining to book any new business for first quarter. Some of the agencies are even turning down negotiations for tonnages from some of their established contract customers, because of the absence of additional mill capacity over the remainder of the year, or through first quarter of 1916.

In the case of several large producing interests, it is stated that the offered tonnages have so far exceeded the capacity of their plants by 200 to 300 per cent. All of the producers are holding rigidly to 1.40c for last quarter. Interests that are sold up say that if they had tonnages to offer, it would not be let go at less than 1.50c, either for immediate requirements or first quarter needs.

Hoops, Bands and Shafting

Pittsburgh, Oct. 12.—All makers of cold rolled steel shafting are quoting 60 per cent off the list, which quotation was adopted a week ago. Shafting interests are unable to promise deliveries in less than from 60 to 90 days. Some mills have enough tonnage on their books to keep plants running at maximum capacity until the latter part of the first quarter. Specifications for hoops and bands are heavy and prevailing prices are decidedly firm.

C. F. Hertz Saw Supply Co., Detroit, Mich., has increased its capital stock from $4,200 to $10,000.

Scrap is Slow

Showing Little Activity—Buyers Not in the Market

Philadelphia, Oct. 11.—Scrap market conditions in this district practically are unchanged. Consumers of the tonnage grades are not in the market, owing to recent heavy purchases and activity in the main is confined to the brokers covering on old orders. It probably would require concessions to induce the works to buy steel scrap, but sellers also are content to let the market drift for a while, owing to the strong fundamental conditions. Brokers offer $14.50 to $14.75, delivered, for heavy melting steel. The local locomotive builder placed several thousand tons of No. 1 cast at $14, delivered. Low phosphorus is scarce, but buyers now offer $20 to $25.50, delivered, as compared with recent sales of $20.50 to $21, delivered. The Philadelphia navy yard this week distributed 2,000 tons of scrap, including 1,000 tons of heavy steel.

Buying Cast Scrap

New York, Oct. 12.—New England foundries continue to close for considerable tonnages of cast scrap, and Jersey buyers also are taking fair quantities of the same grade. This buying stands out in the new business from consumers now being closed, as few fresh orders are being placed in other grades of old material in this district. There is considerable trading between the yards and the dealers on old orders from the steel works and other consumers. Special machinery cast has been sold to New England buyers at $15.25 to $15.50, delivered, and No. 1 heavy at $15, delivered. Special machinery grades for New Jersey delivery have brought up to $13.75, delivered. While the general market is quiet on the side of consumptive buying, the present lull is regarded as only temporary and the undertone is strong. No marked weakness in prices is being shown.

Surplus of Turnings.

Buffalo, Oct. 12.—The marked activity of so many mills in different centers producing shrapnel is causing a surplus of machine shop turnings to appear in the scrap market. The production at the present time is far in excess of the demand, causing turnings to weaken somewhat in price, but not enough as yet to alter the previously quoted schedules. Old steel axles and old iron axles have been advanced 50 cents per ton owing to the increasing scarcity of these lines at the time. Old car wheels and the lines that are equivalent to pig iron are being let out by the yards in moderate tonnages only at existing prices. The dealers are inclined to the belief that these lines will experience an increase in price shortly parallel with the stiffening of the pig iron market.

Fails to Recover

Pittsburgh, Oct. 12.—The old materials market has failed to recover from the effects of the slump which hit it six weeks ago. Heavy melting steel is being sold at a spread from $14 to $14.25, or 25 cents a ton less than the previously prevailing maximum price. However, consumers are reducing stocks rapidly and an early buying movement is expected. Low phosphorus steel scrap has been sold at $20.50 a ton this week.

Iron Slow at Cincinnati

Cincinnati, Oct. 12.—The scrap market is moving slowly from week to week without feature. New transactions are scarce, but shipments of steel-making iron on old orders to rolling mills continue heavy, and are the one bright spot in the market. Jobbing foundries have not been taking much scrap iron, and have been complaining of the high price of No. 1 machine cast, which is quoted at from $9.50 to $10 per net ton. Heavy melting steel is given at from $11 to $11.50 per gross ton.

Some Advances

St. Louis, Oct. 12.—While there has been little activity in the scrap market this week, there has been no tendency toward lower levels. Some grades, especially steel car axles, which are in demand for export, have made extraordinary advances. Standard section relaying rails also are in demand, and prices are firm at $21 to $23 a gross ton, f. o. b. cars, according to condition. Railroad offerings this week are: Southern Railway, 5,000 tons; C., St. P., M. & O. railway, 900 tons; Vandalia, 300 tons; Kansas City Southern, 200 tons.

Chicago Scrap Sluggish

Chicago, Oct. 12. — Comparatively little tonnage of iron and steel scrap is being moved in the Chicago district. Steelmakers covered their requirements some weeks ago and, although operations are practically at capacity, deliveries on previous contracts are being held up to some extent owing to lack of storage space. Tonnage of heavy melting steel continues to move toward the east, where prices offer a profit.

Quotations remain comparatively steady, the only item showing a decided increase being steel axles, which are being picked up for export and on which as high as $17 per net ton has been realized.

Railroads are offering numerous lists, but for the most part these are small tonnages. It is believed this is the first of the autumn cleanup. The Chicago, Milwaukee & St. Paul railway is offering 2,000 tons, of which 500 tons are short steel rails. Other lists are as follows: Kansas City Southern, 210 tons; Mobile & Ohio, 100 tons; Soo Line, 700 tons; Chicago, St. Paul, Minneapolis & Omaha, 600 tons; Baltimore & Ohio, 250 tons; Northern Pacific, 850 tons; Southern railway, 4,500 tons; St. Louis Southwestern, 200 tons; Michigan Central, 1,500 tons.

(For complete prices see page 764.)

Warehouse Prices

Are Being Advanced—Business Steadily Improves

Chicago, Oct. 12.—With delivery of steel products from mill exceedingly slow, warehousemen find their business increasing. Prices were advanced a week ago and now are at a level where they promise to remain for some time. No. 28 gage galvanized sheets are still being sold at 4.35c, Chicago warehouse, and No. 28 gage black sheets at 2.65c, while blue annealed are 2.20c, Chicago.

Sheet Prices Advanced

Cleveland, Oct. 12.—Warehouse business continues extremely active and quotations on No. 28 black sheets have been advanced to 2.55c, and on No. 10 blue annealed, to 2.15c, an advance of $2. Although September made a heavy gain over August, October promises to make a considerably better showing than September.

Higher in East

New York, Oct. 12.—Warehouse interests in this district are finding it more difficult to maintain stocks in certain sizes because of the protracted deliveries by the mills. Trade continues on an ascending scale, each month eclipsing the preceding one by a considerable margin. Prices now are $1 higher at 2.05c, delivered in metropolitan territory for steel bars and 2.10c for plates and shapes.

Not all the foreign demand for American-made goods is for war munitions. The Austin Mfg. Co., Harvey, Ill., is engaged on an order for 25 road rollers for France and 35 carloads of road machinery for Russia.

Stove makers, whose trade has been slack for some time, find an increase and some makers report sales 10 to 15 per cent above corresponding periods in 1914.

Pay Premiums for Shapes

Eastern Pennsylvania Mills Obtain High Prices for Prompt Delivery—Consumers Anxious to Contract

Philadelphia, Oct. 11. — Premium prices are being obtained readily by eastern Pennsylvania shape makers wherever they can make early deliveries. A Canadian buyer entered the market in this district for quick steel the past week and paid from 1.60c to 1.80c eastern mill for such lots as he placed, none of which was sizeable. Mainly 8-inch channels were taken. The minimum price at present for early delivery in this territory now is 1.50c, Pittsburgh, or 1.659c, Philadelphia, and the bottom of the market for forward delivery, even on the most attractive tonnages, is 1.40c, Pittsburgh. Buyers are inquiring for first quarter and while no quotations have been made as yet, they seem near at hand for certain cases. It is indicated that 1.50c, Pittsburgh, at least, will be named. Specifications with eastern mills continues very active. Mill orders on hand with one maker represent full output to mid-November. Deliveries are quoted six to eight weeks with some sizes at ten weeks. Some new awards of mill buildings for making war supplies have been closed, including about 2,000 tons quietly placed the past week, of which the buyer has been kept secret. Another urgent inquiry for 1,500 to 2,000 tons, with more to follow, is out.

Railroads Buying More Freely

New York, Oct. 12.—Increased buying by the railroads continues the most conspicuous feature of the structural steel situation in this district. New inquiries for 5,000 to 6,000 tons have been offered, which have increased the pending list of bridge work to approximately 15,000 tons. In addition to the larger tonnage of miscellaneous bridge work offered, bids also went in during the past week on 63,000 tons of elevated railroad construction in Brooklyn for the New York Municipal Railways Corporation. Fabricated prices are showing an appreciable improvement. On the Central Railroad of New Jersey bridge work, bid upon in the week, only two shops quoted below $60 per ton, erected, and there was a range of about $10 a ton between the highest and the lowest bidders. Plain material conditions continue to show steady strength and the mills have all they can do on the continued heavy flow of specifications. Prices in this district are firm at 1.40c to 1.45, Pittsburgh, or 1.569c to 1.619c, New York.

Shapes Selling at 1.45c

Pittsburgh, Oct. 12.—A number of western Pennsylvania mills have sold structural shapes at 1.45c, or $1 a ton above the general market and it is not unlikely that a 1.50c price will be announced within the next 30 days. Demand for structural shapes is heavy; some mills are unable to promise additional material before the latter part of the year. Fabricating interests are busy and are specifying briskly.

Prices Advancing

Cleveland, Oct. 12.—While very few large projects are pending in the Cleveland district, there is a great deal of building, including additions to numerous manufacturing plants, and structural shops are busier than for a long time. The advancing tendency is illustrated by the experience of one man who two weeks ago wished to contract for 2,000 tons of shapes for the first quarter of next year. He was quoted 1.40c and refused to contract, postponing action until a few days ago, when the same seller quoted 1.45c and was unwilling to take more than 500 tons. The buyer was compelled to contract at that figure.

Structurals are Steady

Chicago, Oct. 12. — Demand for structural steel continues strong and mills are well loaded with as much of this material as they desire to take for the remainder of this year. The price is steady at 1.59c, Chicago mill, with no one willing to shade.

Projects closed in the west during the past few days are for small tonnages, nothing as large as 1,000 tons being noted. Fabricating shops are busy with a multitude of small orders, none of which is of importance.

Makes Good Showing

Milwaukee, Oct. 13.—The city of Milwaukee made one of the finest records in its history during September, when building permits of a value of $2,961,938 were issued by the building inspector. Compared with September, 1914, a gain of $1,754,851 is shown, the total cost of new construction authorized a year ago being $1,207,087.

CONTRACTS AWARDED.

Additions to plant of American Distillery Co., Baltimore, 600 tons, of which Dietrich Bros. will furnish 400 tons, and American Bridge Co., 200 tons.

Alterations and addition to Humboldt office building for the Chicago Telephone Co., Chicago, 168 tons, to A. Bolter's Sons.

Northern Pacific Ry. Co., grade separation bridges, Spokane, Wash., 813 tons, to American Bridge Co.

Interstate Iron & Steel Co., mill building, Marion, O., 577 tons, to Mount Vernon Bridge Co.

United States government, post office, Tulsa, Okla., 254 tons.

City of Sheboygan, Wis., municipal building, 210 tons, to Vulcan Mfg. Co., Fond du Lac, Wis.

Bailey avenue viaduct, Buffalo, 500 tons, to the American Bridge Co.

Structural steel and iron work for the Edgewater Beach Hotel, 5345-49 Sheridan road, Chicago, 159 tons, to American Bridge Co.

Bridge for the Boston & Maine railroad, 200 tons, to the Phoenix Bridge Co.

Bridge work for the Central railroad of New Jersey, 1,200 tons, Pennsylvania Steel Co., low bidder, and expected to receive contract.

Building for the New Process Gear Corporation, Syracuse, 200 tons, to the Lackawanna Bridge Co.

Robertson-Cataract Electric Co., Buffalo, factory and warehouse addition, 200 tons, to Buffalo Structural Steel Co.

Atcheson Graphite Co., Niagara Falls, N. Y., plant addition, 100 tons contract to Buffalo Structural Steel Co.

Community house, United Presbyterian church, North Side, Pittsburgh, 500 tons, to the American Bridge Co.

Buildings for the Touraine Co., Philadelphia, 2,000 tons, indefinitely postponed.

War plant extensions in Philadelphia district about 2,000 tons placed with independent shop; identity of purchasers not announced.

Elevated railroad construction in Brooklyn for New York Municipal Railways, 63,000 tons; American Bridge Co. low on all five sections of work and will receive award.

CONTRACTS PENDING.

Bridge work for the Southern railroad, 2,000 tons, bids being taken.

Power plant for the United States government, Washington, 2,000 tons, bids being taken.

Bridge work for the Maine Central, 2,500 tons, bids being taken.

Extension to plant of Baldt Steel Casting Co., Newcastle, Del., 1,500 to 2,000 tons; bids being taken. Other extensions to follow.

Bridge work for Delaware, Lackawanna & Western railroad for 1916 delivery, 4,000 tons, bids asked.

Will Build Addition. — The Brown Instrument Co., Philadelphia, has just let a contract for an addition to its plant which will furnish nearly 50 per cent additional floor space. The factory which a year ago seemed large enough has been outgrown.

Clarence Metesser, assistant superintendent of the Gautier department of the Cambria Steel Co., Johnstown, Pa., died at the home of his parents in Philadelphia recently. He had been ill for about a year. Mr. Metesser was born in the south in 1873, and after graduating from Tulane university, became connected with his father in the iron business in New Orleans, and later in Kentucky. He entered the employ of the Cambria company in 1901.

(For complete prices see page 764.)

Railroad Buying

Shows Increase—Activity in Car and Rail Markets

New York, Oct. 12.—The New York Central lines continue the leading buyer of cars at the present time and their purchases were further increased during the week by 1,000 additional 55-ton hoppers for the Pittsburgh & Lake Erie. This order was divided between the Pressed Steel Car Co. and the Standard Steel Car Co. This brings the total number of cars purchased by the New York Central system recently to 4,500. The Erie railroad has closed for 200 cars with the Pressed Steel Car Co., but the type has not yet been specified. The Illinois Central is reported to have placed its recent inquiry for 1,000 box cars. The Western Maryland and the Reading continue to figure on 1,000 hoppers each. Reports are current that the Russian government has revived an inquiry for 7,000 freight cars of a smaller type of which reports at various times had mentioned a western car company as the probable builder. This equipment on the average is about one-half the size of the normal freight car.

Rail buying for next year is continuing. The Great Northern has opened negotiations and is expected to close for about 30,000 tons. The Southern Pacific has placed 5,000 tons additional with the Tennessee Coal, Iron & Railroad Co. Up-state New York traction interests are figuring on about 4,000 tons.

The recent rail purchase of the Baltimore & Ohio railroad totaled 62,500 tons, of which the Cambria Steel Co. will furnish 26,000 tons, the Pennsylvania Steel Co., as announced last week, 11,000 tons and the Carnegie and Illinois Steel companies 25,500 tons. The Southern Pacific has placed 1,100 tons of girder rails with the Pennsylvania Steel Co. The Bethlehem Steel Co. will furnish 10,000 tons of the recent New York Central order and 4,000 tons for another eastern line. The Norfolk & Western is inquiring for 5,000 tons of rails.

The Seaboard Air Line has taken no action on its 8,000 to 10,000 kegs of spikes for first half, and it may not buy because of the advanced price. This road also is reported in the market for cars.

Car Wheels Advance

Pittsburgh, Oct. 12.—The purchase of 62,500 tons of steel rails by the Baltimore & Ohio railroad presages heavy buying of rails and track equipment by other interests. The B. & O. has not formally inquired for spikes; requirements for the spring months for this road are estimated to be about 30,000 kegs. Standard steel spikes are held at 1.60c. Demand for steel car wheels continues heavy and shipments to France, Russia and England involve large tonnages. Thirty-three-inch freight car wheels are quoted at $17; 33-inch tender car wheels, $20; 26-inch passenger car and tender car wheels, $24, Pittsburgh.

Light Rails

Have Been Advanced $2—Radiator Company Buys Pig Iron

Pittsburgh, Oct. 13. (By wire.) — The Carnegie Steel Co. and other manufacturers of light steel rails yesterday advanced prices $2 per ton. Domestic and foreign demand continues heavy. The following is the schedule which prevails for carload lots: 25 and 45 pounds, 1.34c; 16 and 20 pounds, 1.39c; 12 and 14 pounds, 1.44c; 8 and 10 pounds, 1.49c.

A Johnstown, Pa., radiator interest is understood to have closed for 1,500 tons of foundry iron for first quarter delivery. Details of the sale are not known.

Connellsville furnace coke for spot delivery is being held at $2, ovens and above.

Spelter Sags

And Non-Ferrous Market in General is Quiet

New York, Oct. 11.—The metal markets today are quiet, in anticipation of the halt in business tomorrow to observe Columbus Day. The volume of buying during the past week generally has been below normal, with the result that prices are somewhat easier. The most marked weakness developed in spelter, which has sagged off more in sympathy with reactions in the London market than for any other reason. Prime western for prompt shipment is quoted at 13.12½c to 13.37½c, St. Louis. October is quoted at 13c to 13.25c, November at 12.62½c to 12.87½c, December at 12.37½c to 12.62½c, first quarter of next year at 11c to 11.25c and first half at 10.75c to 11c. Brass special is quoted at 15.25c, St. Louis, for spot shipment. Statistically, the spelter market is as strong as at any time since the outbreak of the war, since spot and nearby metal is exceedingly scarce.

Good-sized tonnages of copper were sold during the week, but in the aggregate the business booked was considerably below production during the period. Quotations on electrolytic are approximately 18c to 18.12½c, delivered 30 days; on the best brands of casting copper, 17.87½c to 18c, delivered 30 days; on ordinary casting copper, 17.25c to 17.50c, cash; on the best brands of lake copper, 18.25c to 18.50c, cash; on ordinary lake copper, 18c, cash, and on arsenical lake, 17.75c to 17.87½c, cash. A feature of the copper market is the narrowing of the premium on lake copper. This is due to the fact that many consumers who began to use electrolytic copper to avoid paying the high premium asked on lake a few months ago have decided to use electrolytic permanently.

An interesting development last week was the circulation of a rumor here to the effect that the British government had established a duty to be collected on all tin to be exported from the United Kingdom or its possessions. This rumor greatly stimulated demand and resulted in higher prices; cables to London, however, brought back definite word that no such duty had been declared. It still is regarded as likely, however, that a duty of this kind shortly may become operative. An important angle of this situation was the argument which developed as to whether, in the event of the establishment of such an export duty, the seller or the buyer would be liable for the payment of the duty on tin for future shipment which already had been contracted for by buyers in this country. In answer to this question, the board of managers of the New York Metal Exchange on Friday passed a resolution to the effect that the buyer would be held for the duty. The passing of this resolution has called forth much adverse comment, since, consumers contend, most of the tin brought here is purchased on a c. i. f. basis. It is likely that in case of the establishment of such an export duty, steps will be taken to determine the legal aspect of the matter. Tin today was quoted by importers at 32.75c for all positions.

W. H. Underwood has been appointed sales manager in charge of the St. Louis office of the Domhoff & Joyce Co., succeeding W. G. Maguire. Mr. Underwood has been connected with the Cincinnati office of the Domhoff & Joyce Co. for two years, and for several years was on the selling force of the Triumph Electric & Ice Machine Co., Cincinnati.

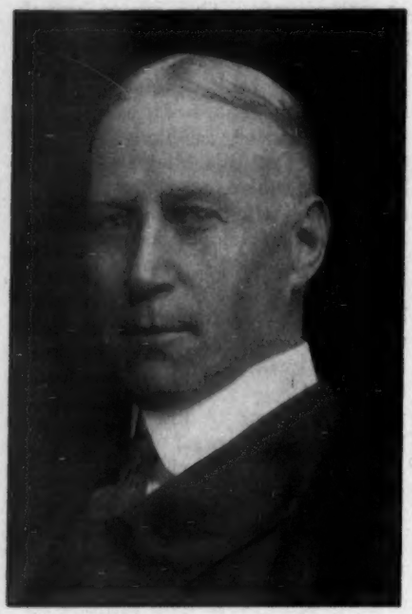
Stanley H. Smith has been appointed district sales manager for the Pennsylvania Steel Co. in Chicago, succeeding Robert E. Belknap, who was recently transferred to the New York office.

(For complete prices see page 764.)

MEN OF THE IRON TRADE

Who they are **Where they are** **What they are doing**

The resignation of Alva C. Dinkey as president of the Carnegie Steel Co. to become head of the Midvale Steel & Ordnance Co., affected a number of officials of the former concern. As reported on page 665 of the Oct. 7 issue of *The Iron Trade Review*, Homer D. Williams, general superintendent of the Duquesne Steel Works, Duquesne, Pa., last week was appointed president of the Carnegie company. William Whigham, former assistant



WILLIAM WHIGHAM

to the president of the company, on Oct. 7 was made a vice president and will serve with Col. H. P. Bope and W. W. Blackburn. The appointment was made in recognition of Mr. Whigham's valued services as an engineer. Edward J. Hamilton, who was assistant superintendent of the Duquesne works, now is general superintendent of that plant. His former position is held by Ambrose N. Diehl, who has been succeeded as superintendent of the blast furnace plant at Duquesne by Harry M. Stewart, former assistant superintendent of the blast furnace department. H. G. Saylor will continue as secretary to Mr. Williams.

William Whigham, assistant to the president of the Carnegie Steel Co., was elected a vice president on Oct. 7. Mr. Whigham is one of the prominent engineers identified with the steel industry, having been connected with that business for about 23 years. Evidence of his work is found in many of the plants of the Carnegie company. He presented a valuable paper on "Fuel Possibilities in Steel Making" before the American Iron and Steel Institute in the meeting at Chicago, in October, 1913.

He was born near McKeesport, Pa., and after a preparatory education entered Stevens Institute of Technology, from which he was graduated in 1888. In 1892, he became identified with the Carnegie company in an engineering capacity in the armor plate department at the Homestead works, and in 1896 was sent by the company to Russia in connection with armor plate contracts. Later, he became steam engineer of the Homestead Steel Works, and in 1901 was appointed superintendent of the Howard Axle Works, where he remained until 1905, when he was made assistant to the president of the Carnegie company. Since that time, he has been engaged in engineering construction and other technical work for the company, and has devoted much of his time to the improvement and consolidation of its manufacturing facilities.

Edward J. Hamilton, who was appointed superintendent of the Duquesne Steel Works of the Carnegie Steel Co., to succeed Homer D. Williams, the new president, was born in 1867 in Johnstown, Pa., where he received his education. While attending high school, Mr. Hamilton worked at frequent intervals in the plant of the Cambria Iron Works, where he remained until 1887, when he accepted a position with the Lorain Steel Co., at Johnstown. Mr. Hamilton was identified with that interest until the flood of 1889 devastated the city.

Four months after the flood had passed into history, Mr. Hamilton obtained employment at the Edgar Thompson Steel Works, Braddock, Pa. He remained at that plant until July 15, 1892, when he was transferred to the Homestead plant of the Carnegie company. In 1897, he was made assistant general superintendent of the Duquesne Steel Works, at Duquesne, Pa., in which capacity he remained until appointed general superintendent. Mr. Hamilton is the first vice president of the Duquesne Trust Co. and is the vice president of the Carnegie Library at Duquesne. He is a member of the Pittsburgh Athletic Club, the Country Club and the German Club of Pittsburgh.

Ambrose Nevin Diehl, appointed assistant general superintendent of the Duquesne Steel Works, to succeed Mr. Hamilton, is one of the most prominent blast furnace superintendents in the country. He was born in York, Pa., Oct. 20, 1876, and after

EDWARD J. HAMILTON

attending the public schools of that city, entered the York Collegiate Institute, from which he was graduated in 1894. In the autumn of that year, he entered Pennsylvania State College and was graduated four years later as a chemist.

To obtain a practical knowledge of the science of chemistry, Mr. Diehl entered the state experimental station of Pennsylvania as assistant chemist, which position he held only one year. In 1899, Mr. Diehl went to the Duquesne Steel Works, where he first worked in the laboratory. Before he had been with the company 12 months he was made assistant superintendent of the blast furnace plant; 12 months later, he took full charge of the blast furnace department.

Mr. Diehl has been a frequent contributor to the technical press of this

MEN OF THE IRON TRADE

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country. He is a member of the University Club of Pittsburgh, the American Institute of Mining Engineers, the Engineers' Society of Western Pennsylvania and the American Iron and Steel Institute.

Harry M. Stewart, assistant superintendent of the blast furnace plant at Duquesne, appointed superintendent of that plant to succeed A. N. Diehl, was born at Turtle Creek, Pa., and after graduating from the public schools at North Braddock, Pa., entered Pennsylvania State College, where he was graduated as a mining engineer in 1896. The following year, he obtained a position in the electrical department of the Homestead Steel Works of the Carnegie Steel Co.

AMBROSE N. DIEHL

In 1901, Mr. Stewart went to Duquesne, where he became identified with the blast furnace department, which consists of six modern stacks. In 1905, he was made night foreman of the plant and a year later became general foreman. Eight years ago, Mr. Stewart was appointed assistant superintendent of the blast furnace department.

H. G. Prout has resigned as president of the Hall Switch & Signal Co., Garwood, N. J.

Neal A. Salsich, who has been manager of sales of the Pennsylvania Steel Co. at Steelton, has been made assistant sales manager of the company, with headquarters at Philadelphia.

J. E. Jennings, connected with Milliken Bros., Inc., at New York, sailed this week for London.

R. S. Bryant, for many years consulting engineer of the Standard Welding Co., Cleveland, O., has been appointed factory manager in charge of all manufacturing.

John E. James, who has been employed in the general office of the Republic Iron & Steel Co., Youngstown, now is connected with the Philadelphia office of that company.

Thomas O. Gilland, formerly with the Berwind-White Coal Mining Co., has been engaged by the Eastern Steel Co. as a salesman for its Philadelphia office.

A. L. Roberts, formerly an engineer with the Brown Hoisting Machinery Co., Cleveland, has accepted a position as designing engineer for the Crown Cork & Seal Co., Baltimore.

Waldo H. Blackmer has retired from the Hubbard Machine Co., Worcester, Mass., of which he was a partner and the business will be continued by Chester E. Williams.

H. S. Endsley, solicitor and general agent for the Cambria Steel Co., Johnstown, Pa., will retire Dec. 1. Mr. Endsley has been with the company 23 years.

H. L. Wittstein, efficiency engineer with the Knox Motors Co., Springfield, Mass., has resigned to take the position of assistant to the management of the Standard Fuse Corporation, of Paulsboro, N. J.

James P. Nelson, member of the valuation committee of the Chesapeake & Ohio, and the Chesapeake & Ohio of Indiana, has been placed in charge of the engineering work of the committee.

Harry W. Hand, vice president and general manager of the Wm. Cramp & Sons' Ship & Engine Building Co., has been elected a director of the Industrial Trust, Title & Savings Co., Philadelphia.

A. B. Howard, for many years connected with the New York office of the American Express Co., 65 Broadway, has sailed for Buenos Aires to establish the initial South American office of the American Express Co., where Mr. Howard, as manager of the South American department, will make his headquarters.

W. N. Wyeth, who for a short time was the New York representative of John J. Caine, Philadelphia, iron and steel scrap, has resumed his old position in the iron and steel scrap department of the United States Metal & Mfg. Co., 165 Broadway.

W. Gordon Armstrong, department manager for the Worcester Pressed Steel Co., Worcester, Mass., the past four years, has resigned and accepted a position as assistant to the president, John W. Rapp, at the Empire Art Metal Co., College Point, N. Y. He is succeeded by Robert Ashman, Bridgeport, Conn.

HARRY M. STEWART

William W. Wallace, of the sales department of the Youngstown Sheet & Tube Co., Youngstown, has accepted a position with the H. Koppers Co. Mr. Wallace was graduated from the Carnegie Institute of Technology and was in the mechanical department of the Youngstown company four years.

R. H. Marvin, electrical engineer with R. Thomas & Sons, East Liverpool, O., will read a paper on the "Manufacture and Testing of High Voltage Porcelain" at the October meeting of the Pittsburgh Section of the American Institute of Electrical Engineers, which will follow a dinner at the Seventh Avenue hotel.

Ore Unloading

Will be Witnessed by Members of American Iron and Steel Institute

One of the interesting features of the ninth meeting of the American Iron and Steel Institute, which will be held in Cleveland, Friday and Saturday, Oct. 22 and 23, will be the inspection of the Pennsylvania ore dock on Saturday morning, when the operation of unloading ore from a large freighter will be witnessed. The members will leave the Hotel Statler in automobiles at 9 a. m., and will proceed to the Pennsylvania ore unloading plant. At 10:30, the party will board a special train for the automobile building plant of the White Co., where an opportunity will be afforded to witness the manufacture of motor cars and motor trucks. After the inspection of this plant, the party will be taken by automobiles to the Country Club, where lunch will be served and the privileges of the golf course of this club will be extended to the visitors. The courtesies of the following clubs also will be extended to the members of the American Iron and Steel Institute during their stay in Cleveland: Union Club, Cleveland Athletic Club, Country Club, Mayfield Golf Club and the Shaker Heights Country Club.

Three business sessions of the Institute will be held Friday, Oct. 22, morning, afternoon and evening, at the meeting headquarters, Hotel Statler. The banquet will be in the grand ball room of the Hotel Statler Friday evening. A large number of Cleveland manufacturers have extended invitations to the members for the inspection of their plants and guides will be stationed at the Hotel Statler to direct the members, automobiles being available for making these trips.

Taylor Memorial Meeting

At the meeting to be held at the University of Pennsylvania, Oct. 22 and 23, in memory of Frederick Winslow Taylor, the speakers will be: Rudolph Blankenburg, mayor of Philadelphia; Carl G. Barth, Louis D. Brandeis, James M. Dodge, Edgar Faps Smith, provost of the University of Pennsylvania; Henry L. Gantt, Harlow S. Person and Sanford E. Thompson.

Sessions will be held Friday evening at Houston Hall, University of Pennsylvania; Saturday morning at Boxly, Mr. Taylor's home, Chestnut Hill, Philadelphia; at 12:30 p. m. at Mr. Taylor's grave in West Laurel Hill; at 4 p. m. at the Hotel Adelphia, Thirteenth and Chestnut streets, when a paper will be read by Richard A. Feiss, of the Clothcroft Shops, Cleveland, on social service work, and at 8 p. m., at the Hotel Adelphia.

Steel Houses

Wanted in War Zone—Requirements Are Tremendous

An interesting war proposition to which certain eastern steel makers now are giving attention concerns the building of great numbers of portable houses for the battle territory. Certain of the allied governments are negotiating with manufacturers in this country for the designing and building of these shelters which, though intended to be temporary in character, must be durable and complete enough to accommodate family life for an indefinite period. Originally inquiries were put out for vast quantities of lumber from which to construct these houses, but it was found this material would make the cost excessive and the plan was dropped. Now it is proposed to employ steel construction, which if a uniform design is adopted, can be produced in great numbers at a minimum cost.

The proposed houses are to be 12 x 24 feet in ground dimensions and 9 feet high. They are to contain two rooms. A plan now designed calls for the use of a frame work of light channels and a covering of 26 to 28 gage galvanized sheets or some other uninflamable material. Each of these structures will contain about a ton of steel. If this type is adopted, the aggregate steel requirements will be enormous in view of the great numbers required. France alone has been considering the ordering of 100,000 houses and the other entente powers are expected to order in equal proportion.

The houses are to be used both to shelter the soldiers at the front and to provide comfortable accommodations for the general inhabitants in devastated territory until the final reconstruction work in these districts safely can be inaugurated.

Warner & Swasey Strike

Cleveland, Oct. 13.—A strike called at the plant of the Warner & Swasey Co., here, this week, resulted in only a part of the men quitting work. F. A. Scott, secretary-treasurer of the company, declares that 50 per cent of its machinists remain at work. The strikers demand an eight-hour day at 10 hours' pay. Led by a professional strike organizer, a number of the disaffected Warner & Swasey employes marched past the Peerless Motor Car Co. and other plants, urging the men within to join them.

Want Aid

Need Assistance in Studying Problem Presented by War Cripples

New York, Oct. 12.—The problem of caring for approximately 2,000,000 men, who already have suffered the loss of limbs or faculties in the European war, and for the countless numbers who may be mutilated before the conclusion of the conflict, was discussed here tonight before the American Society of Mechanical Engineers, by Frank B. Gilbreth. He believes that remunerative occupations can be discovered for the majority of the crippled men, and he described methods of motion study which may aid in the discovery of suitable occupations.

Mr. Gilbreth exhibited "simultaneous cycle motion charts", which showed in detail the interrelation of the individual motions and cycles of motions involved in the performance of certain types of work. These charts, he said, indicate which members or faculties of the human body are doing the work or are available for doing part or all of the work. By analysis of such a chart, it is possible to work out new sequences, cycles and methods of doing certain operations. Thus, many types of work formerly considered possible only for men in complete possession of their faculties and members can be adapted to crippled workers.

The data included in simultaneous cycle motion charts, stated Mr. Gilbreth, are gathered by the use of the micromotion, chronocyclegraph, and other methods of recording motion data. From these records it is possible to make motion models from which the desired motions for any piece of work may be visualized—a feature which is particularly advantageous in the case of crippled learners who must specialize in some sense training.

While this method of study is bringing gratifying results, according to Mr. Gilbreth, no great progress can be made with the crippled soldier's problem without world-wide cooperation. Those in charge of the work, he said, need photographs, records and histories of cases where cripples have been successfully taught to do work. Suggestions are needed in regard to adapting machines, tools and other equipment or surroundings to the different types of crippled workers.

The Burford Motor Co., of Fremont, is figuring on an order for 50 trucks for the Roumanian government. This concern has finished orders for Austria and Italy recently.

Mining Methods on Gogebic Range

Character of the Ore Bodies is Discussed and the Methods of Mining Both Hard and Soft Ores Described

BY O. E. OLSON, O. M. SCHAUS AND FRANK BLACKWELL

BEFORE entering upon a discussion of the methods used in extracting the iron ores of the Gogebic range, a brief description of their nature and occurrence may serve to make clearer the reasons for the particular methods in use.

The iron bearing member is a very regular one, the productive portions of which extend about 25 miles east and west. The strike of this formation runs about north 60 degrees east at the west end, gradually approaching due east between Bessemer and Wakefield, and tending a little south of east beyond Wakefield. The dip is about 64 degrees to the north, though this will vary locally from 50 to 80 degrees. On the south or foot wall side is a very vitreous quartzite, and south of that a quartz slate. The iron-bearing member is made of ore bodies, ferruginous slates and ferruginous cherts, with small amounts of cherty iron carbonate still unaltered. North of the iron formation is a black slate, and beyond this, the trap rock. Cutting through these formations are numerous diorite and diabase dykes, which generally dip at right angles to the footwall, and pitch downward toward the east, though there are several cases where the pitch is toward the west. The footwall quartzite, the ferruginous slates and the dykes are generally impervious to water. The largest ore bodies are usually found in the troughs formed where the dykes cut through these two other strata.

From the uniformity with which these formations run, development work generally consists of drifting on the footwall, with occasional crosscuts through the ferruginous slates and raises wherever it is possible to find a trough formed by a dyke and the two other formations. Wherever ore bodies occur in these troughs, the ore will usually be a soft ore, and the large bodies of the district are of this nature. In some mines the bodies occur as narrow veins, lying either on the quarzite or on the slate. These veins usually extend to greater heights than those which bottom on the dykes, and are generally made up of hard ore.

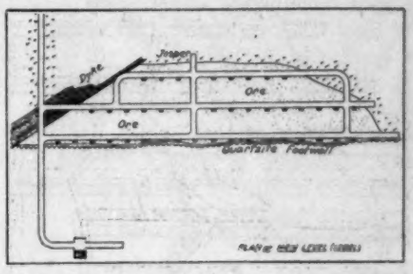

FIG. 1—IDEAL PLAN OF MAIN LEVEL

The principal methods of mining are sub-level slicing, which is general in soft ore bodies, and various forms of back and underhand stoping, and milling, which are used in hard ore bodies. The sub-level slicing method, by which the greater bulk of the ore is mined, will be considered first.

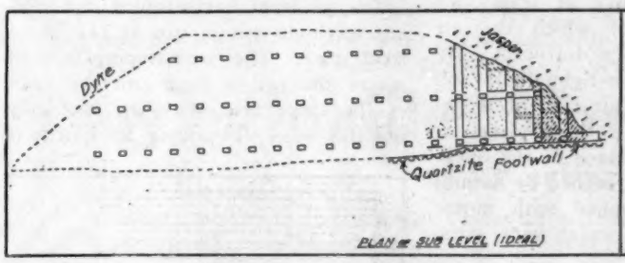

FIG. 2—IDEAL PLAN OF SUB-LEVEL

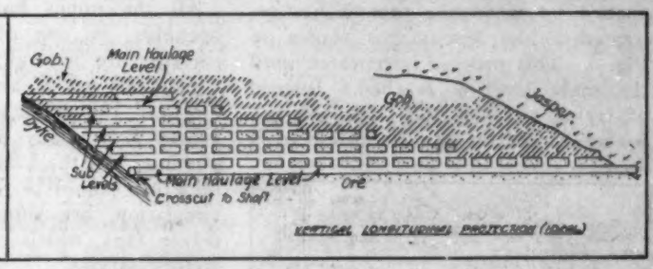

FIG. 3—IDEAL VERTICAL LONGITUDINAL PROJECTION

Sub-Level Slicing

In the determination of the limits of the ore body, a drift is driven on the strike of the formation, a short distance from the footwall, and carried to the end of the ore. Crosscuts from 100 to 300 feet apart are driven to the capping. If the width of the ore permits, one or more drifts are driven parallel to the footwall, leaving pillars of about 50 feet between. As this drifting progresses, a few raises are put up to test the height of the ore, if it is a new ore body. After the general limits of the ore are determined, a regular series of raises are put up, commencing at the end farthest from the shaft. The raises are spaced about 35 feet apart, and are placed in line north and south upon the several drifts, as shown in Fig. 1. These raises are 3 by 7 feet inside of timbers. They are lined with 6-inch cribbing, which is cut to a length of 3 feet between joggles, so that all pieces are interchangeable. Double dividers are used between the ladder and chute compartments, so that if the chute side wears out, the repairs are much simpler.

When these raises reach a height of 20 to 23 feet above the floor of the level, a sub-level set is put in, and the raise is continued upon the back of this set to a height of from 17 to 20 feet above the floor of the first sub, when another sub-level set is put in. This is carried out till the top of the ore is reached.

Beginning on the top sub of the line of raises farthest from the shaft, a crosscut is driven from the foot to the hanging rock. Slicing drifts are driven lengthwise of the ore body, from this crosscut, to the rock that marks the end of the ore. The floor of the slice drift is then covered with boards or slabs, and the back of the drift is caved down, extending up to the capping or to the cave left by the workings above. When one slice drift has been drawn back to the crosscut, another is driven along the side of it, in some instances leaving pillars about 3 feet between drifts. This pillar is drawn back along with the drift. In the meantime the next crosscut has been opened, and slicing drifts driven to the cave left by the first crosscut. This block is drawn back in the same manner as the first,

Presented at the recent meeting of the Lake Superior Mining Institute.

and so on, working back to the shaft. If the ore body is wide, with several raises in each crosscut to dump into, the slicing would begin midway between raises, and several gangs might work in the same crosscut, each drawing back to its own raise. If the ore is narrow, the caving is begun at the hanging, and carried back toward the foot, as shown in Fig. 2. If the raises on the main level are spaced 50 feet apart, thus making wider blocks on the sub-level, slicing drifts from the first crosscut will be driven to meet those from the second crosscut, and half the block will be drawn back to each. The next sub below is opened up in the same manner as the top sub, and slicing is begun as soon as the top sub is drawn back to a safe distance. The caving above the second sub is carried up to the boards, with which the bottom of the top sub is covered. These not only permit of a clean extraction of ore, but also indicate that all of the back has been removed. The bottom of the second sub is likewise covered with boards, and the ore is drawn back in the same manner as on the top one. The back of the stope begins to break off and forms what is called the gob. This serves a double purpose, acting as a cushion against any large falls of ground, and, on account of the way it holds together, permitting the extraction of all ore underneath it, before giving away. The top sub is always carried back a safe distance ahead of the second sub, and the third sub is opened up when the second has retreated a like amount, as shown in Fig. 3. This process is repeated until the main level is reached. Instead of trying to draw this, it is allowed to stand until it can be taken from

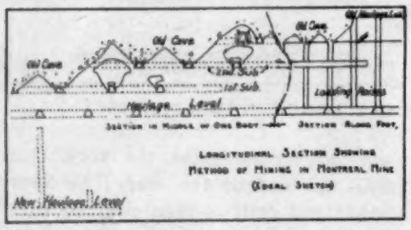

FIG. 4—METHOD OF MINING IN MONTREAL MINE

below, when it is treated as a sub-level.

The ore in the subs is trammed in one-ton cars called buggies. The chutes are protected by steel rails, laid crosswise and spaced from 8 to 10 inches apart, which guard against anyone falling into them and serve to limit the size of chunks which can be sent to the shaft. The ladder-way is covered with a self-closing door, either latticed or tightly boarded, depending upon the direction of the ventilation.

The item of ventilation has become one of great importance in the mines

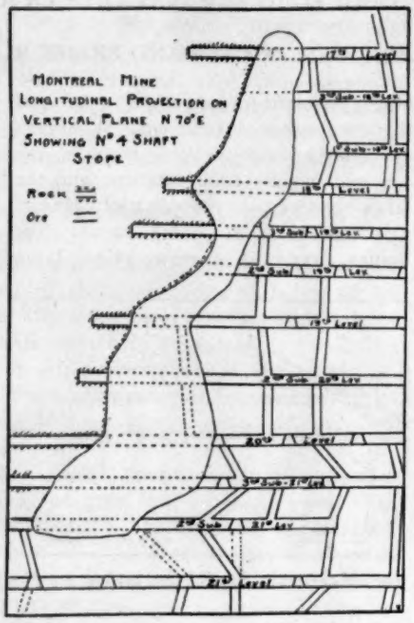

FIG. 5—TYPICAL SHAFT STOPE AT MONTREAL MINE

with large bodies of soft ore which necessitate the use of large amounts of timber. The heat and gases, generated by decaying timber, must be constantly carried away from the working places, in order to enable men to work efficiently.

All the mines have at least two openings, in one of which the air currents are naturally downcast. By a judicious use of air-tight doors and brattices, this fresh air current is deflected to as many working places as possible, and the balance of the openings that cannot be reached by natural circulation, are supplied with motor driven fans, which render very satisfactory service.

The sub-levels are kept connected with the main level above as much as possible, so that timber can be brought from the shaft on the main level, and dropped down through the raises to the lower subs, instead of being hoisted up from the main level below. Wherever it is necessary to hoist timber, a small puffer is mounted on a truck which can be transferred to different places, and the timber hoisted by power. In all of the shafts sunk in recent years, the cage compartment is wide enough from foot to hanging, to admit of a truck, loaded with timber at the surface, being wheeled on the cage and lowered into the mine, thus saving any extra handling. The chutes of the raises are closed by steel quadrant doors, operated by hand levers. The ore is loaded into two-ton saddle back steel cars, hauled by electric motors. At the shaft it is dumped into large storage pockets, beneath which are auxiliary pockets that hold one skip load. Skips vary in capacity from 4 to 7 tons. The electric motors are equipped with automatic gongs, which give warning of their approach, when still some distance away. Red lights are carried on the rear cars, and automatic block signals are used at points where two motors are run over the same track. At the chutes, the trolley wire is protected by guards, to prevent the chute tender from coming in contact with it, while filling cars.

In soft ore deposits, all drilling is done with power augers. Three types of bits are commonly used, the diamond point bit for mixed, rubbly ground, the chisel bit for uniform hard ground, and the fish-tail bit for soft ground. The speed of drilling with augers varies from 5 to 14 inches per minute, and a round of holes takes from one to two hours, depending on the ground. Stoping drills are used for back holes and raises. The hollow steel water drill is being used with great success in hard ore and jasper. The heavy reciprocating drills are still used for hard cherty jasper. In shaft sinking in slates and granite the hollow steel jackhammer is used almost entirely. This same type of drill is now being mounted on a carriage, and is a success in putting in horizontal holes.

The sub-level, back-stoping and milling methods are in use at the Montreal mine. The back-stoping is used where the ore is hard and the back of the stope firm, with the ore body not too wide. The main level drift is

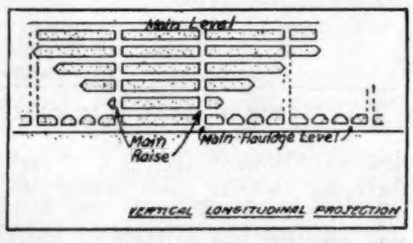

FIG. 6—METHOD OF SUB-SLICING AND STOPING

run along the foot, and crosscuts are driven every 50 feet, with raises on the footwall opposite each crosscut. The main levels are 100 feet apart, and one to three subs are opened, with drifts along the foot, and crosscuts spaced 25 feet apart, driven to the hanging. Branch raises, equipped with chute discs, are put up from the main raises, starting about 25 feet below the sub. Stoping then starts at the hang-

ing, and is carried back toward the foot. Several grades of ore may be stored in the sub-raises, and held until the main raise is clear, thus simplyfying the grading.

The sub-level milling system is used where the ore body is wider, and the back not so firm. Better results as to grading are also obtained. Where the ore body is 100 feet wide or more, foot and hanging drifts are driven with crosscuts every 50 feet. Raises are put up on both drifts, 25 feet apart. The main levels are 100 feet apart and three subs are laid out. Beginning on the top sub, from the foot raise nearest the middle of the ore body, a crosscut is driven to the hanging. Raises are put up on both sides of this cross cut, inclined 45 degrees east and west, and spaced 10 feet apart. These raises are provided with chutes, but do not need to be cribbed. Similar crosscuts are opened up 50 feet away on either side, and the raises from these crosscuts meet those put from the first crosscut. The ore is then milled into the chutes and trammed to the main raises. This finally leaves a hog-back between the crosscuts. The crosscuts on the second sub are staggered with respect to those on the top sub, so that the raises from the second sub will come up in the crosscuts of the top sub. The milling from the second sub then takes all of the ore left in the hog-back of the first sub, and leaves a similar one on the second sub. In some places milling starts midway between foot and hanging, and the draw is both ways. The top sub is kept ahead of those below, and when the draw reaches the main raises, the ore is milled directly into them, as shown in Fig. 4.

Auger drills are used extensively in the milling system, but the large reciprocating drills are used entirely in back-stoping. The chief difficulty in both of these methods, is to keep the main raises in repair, as the wear and tear on the chutes caused by hard ore is much greater than in the soft ore mines. There are double dividers between the ladder and chute compartments and bearing pieces are put in every 25 feet, so that sections may be repaired, without ripping out the entire raise. Where it is necessary to drop the ore any great distance, it is confined in chutes at each level, in order to break the fall and decrease the speed with which it runs through the raises. On account of the small amount of timber used, and the open stopes which are left behind, no trouble is experienced with ventilation.

Combine Sub-Slicing and Stoping Methods

A combination of sub-slicing and stoping is in use in several mines where the ore is not uniformly hard enough for back-stoping, and where there are irregularities in the width of the ore. Sub-levels are opened up from a few main raises, leaving a back of ore over each sub of about 10 feet. The sub-drifts are timbered where necessary, and the only difference so far, from the slicing method, is that the lower subs are developed more rapidly than the upper. In case the ore should turn out to be too soft for stoping, the system of mining could be easily changed into the slicing system. Commencing at points midway between the main raises, a series of chutes with wide, flaring mouths, are put up to the bottom sub, and the miners begin to break half of the back between the bottom and second subs. The miners on the second sub then break the remainder of the bottom of that sub, and also half of the back between them and the third sub. This is carried on up to the main level above. The lower subs are always drawn back a little ahead of those above, so that the broken ore will have a free drop to the chutes below, from which it is trammed to the shaft. This method is shown in Fig. 6. The back of the main level is stoped down when it is no longer needed as a protection for tramming.

In the end, any system, suitable to the kind of ore, which may be adopted by a mine, must be altered more or less to suit a particular case. This is especially true of sub-level slicing. In some of the soft ore bodies, the ground does not crush as easily as in others, and as a result the subs may be opened up farther in advance of the mining. The amount of a back which should be left over a sub, is a thing which must be worked out by experience for each mine.

In all of the mines of the district, the aim is to increase safety in working conditions. Frequent inspections are made at all mines, to see that the rules and regulations in regard to safe operation are carried out. That this policy has born fruit, is evidenced by the decrease in serious and fatal accidents during the last half decade.

How Sulphides May Exist in Steel Ingots

BY J. O. ARNOLD AND G. R. BOLSOVER

IN A former paper on the subject of sulphides in steel ingots, the authors stated, "It is a remarkable fact that the casts exhibiting more or less well-marked areas of the eutectic mixture all contained aluminum, while those presenting no evidence of a eutectic contained no aluminum. These facts suggest that the very small amount of aluminum present plays some part either in forming the eutectic or in preserving the pattern of the fallen-out manganese sulphide by checking its segregation into relatively large masses." The present paper contains the results of experiments made to decide definitely, if possible, the accuracy or otherwise of the authors' suggestions in this regard, which are quoted above.

A paper read at the spring meeting of the British Iron and Steel Institute.

About 12 pounds of a certain crucible cast, No. 1499, with a total weight of about 48 pounds was poured into an iron mold 1¼ inches square, without any addition of aluminum. The remaining 36 pounds was put back into the furnace, in a fluid state in the crucible, and allowed to cool in a lump overnight. Thus were obtained portions of identical steel quickly and slowly cooled. Drillings were taken near the top of the ingot and near the top and bottom of the lump, and on analysis registered the following figures:

Constituent	Ingot near Top per cent	Top of Lump per cent	Bottom of Lump per cent
Carbon	0.26	0.26	0.20
Silicon	0.07	0.08	0.06
Manganese	1.11	1.07	0.76
Sulphur	0.52	0.53	0.30
Phosphorus	0.02	0.02	0.02
Aluminum	0.00	0.00	0.00

The main segregations noted in the lump are 0.23 per cent sulphur and 0.31 per cent manganese. Both these segregations are doubtless largely due to a common cause, namely, the rising towards the top of the lump of manganese sulphide.

Another ingot, No. 1461, which had been cast 1¼-inches square, after the addition of about 0.03 per cent of pure metallic aluminum, was analyzed for segregation on drillings taken from both the top and the bottom of the ingot. The following percentages were indicated:

Constituent	Top of Ingot per cent	Bottom of Ingot per cent
Carbon	0.27	0.28
Silicon	0.17	0.16
Manganese	0.74	0.78
Sulphur	0.42	0.48
Phosp'orus	0.02	0.02
Aluminum	trace	trace

These figures show that the aluminum had practically prevented any

segregation. This curious and unexplained action of aluminum was discussed by B. Talbot in an exhaustive paper on "Segregation in Steel Ingots." The amount of aluminum employed by Mr. Talbot was very small, amounting to only about 0.007 per cent per ingot.

Fig. 1 shows the structure of ingot No. 1499, so far as sulphides are concerned. The manganese sulphide is distributed in irregular sectional patches of a dove-gray color. With these, and often in juxtaposition, are a limited number of smaller patches of pale brown iron sulphide. Fig. 3 shows the segregation under the influence of slow cooling of the manganese sulphide into relatively huge rounded masses. With one of these clear-cut areas of iron sulphide are juxtaposed, while an isolated elongated streak of iron sulphide is also present. These two sulphides, when present together under steel-making conditions, so far as the author's experience goes, never interpenetrate to form a solid eutectic solution or double sulphide, but are always sharply segregated.

Of crucible cast No. 1540, weighing about 48 pounds, nine pounds were poured into a 1¼-inch square ingot, while the remaining 39 pounds were returned in the crucible to the furnace, and allowed to cool overnight. To this cast about 0.05 per cent of metallic aluminum was added five minutes before teeming the small ingots. The composition of this ingot, and also of the top and bottom of the lump, are set forth in the following analyses:

Constituent	Top of Ingot per cent	Top of Lump per cent	Bottom of Lump per cent
Carbon	0.30	0.30	0.26
Silicon	0.16	0.16	0.19
Manganese	1.02	1.02	1.02
Sulphur	0.49	0.49	0.48
Phosphorus	0.02	0.02	0.02
Aluminum	0.01	0.01	0.01

The aluminum has virtually prevented any segregation in the very slowly-cooled lump, whereas such segregation with reference to carbon, sulphur and manganese was well marked in the non-aluminum lump of cast 1499.

Micrographic Structure

Ingot No. 1540 presented the structure shown in Fig. 2. There are irregular sectional patches of dove-gray manganese sulphide, and a few streaks of pale brown iron sulphide, in which pieces of manganese sulphide are embedded. But the most remarkable features are areas showing the eutectic structure of a decomposed solid solution or compound (xFe, yMnS) described in the author's paper already referred to. The aluminum has, by largely checking the segregation of the minute particles of manganese sulphide into comparatively large masses, preserved very clearly one large and several small areas of the eutectic mixture (xFe + MnS). The term eutectic as here applied, if convenient, is almost certainly inaccurate, because this word has common reference to the "constituent last fluid," but the present constituent, from facts in the author's possession, is probably the constituent first to freeze, say at a temperature of 1,450 degrees Cent. Fig. 4 shows, in the slowly-cooled alloy, this so-called eutectic structure on a relatively huge scale, and areas of this type occur frequently throughout the microsection, being surrounded by regions of ferrite (and pearlite) relatively free from sulphides.

The structure of Fig. 4, it will be noted, consists almost entirely of large and smaller nodules of manganese sulphide. A single streak of iron sulphide is also present, and in one end of this there is embedded a little nodule of manganese sulphide. The contrast of the segregation of manganese sulphide in Figs. 3 and 4 is remarkable, and constitutes additional testimony to the power of aluminum in checking sulphide segregations.

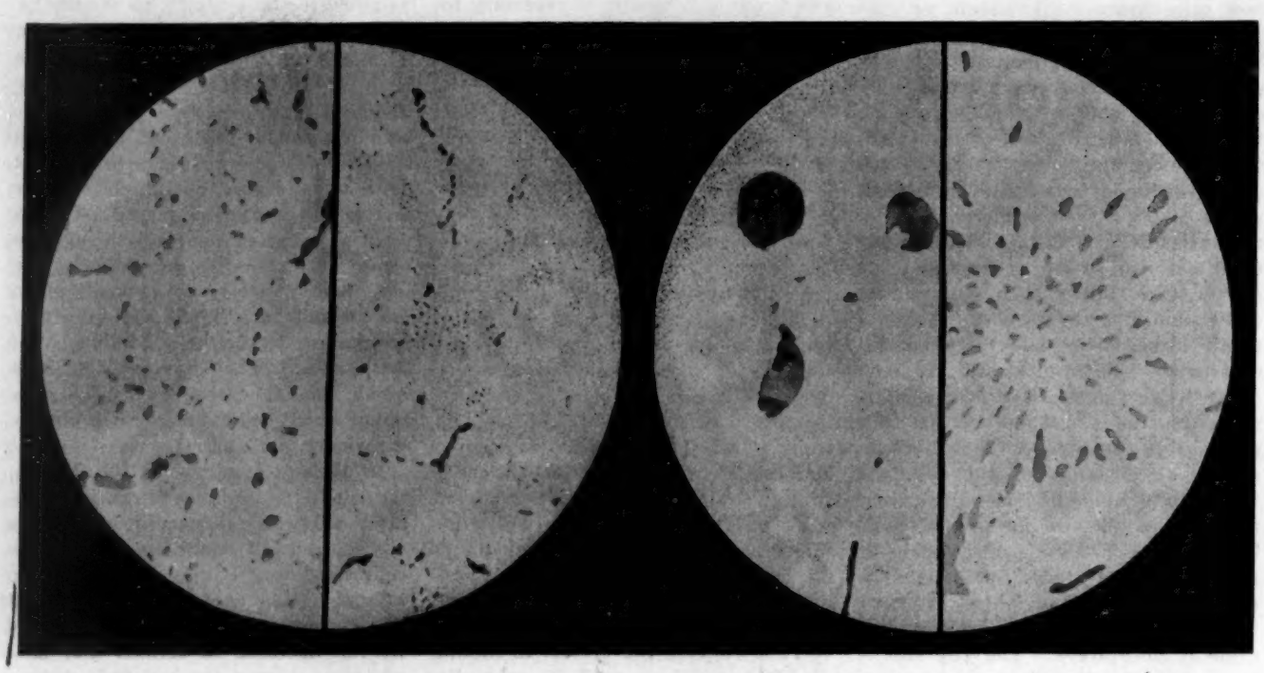

FIG. 1—STRUCTURE OF INGOT, NO. 1499

Sulphur ..... 0.517 per cent
Manganese ..... 1.11 per cent

Without aluminum. Quickly cooled. Magnified 450 diameters, and reduced one-half in reproduction. Unetched.

FIG. 2—STRUCTURE OF INGOT, NO. 1540

Sulphur ..... 0.493 per cent
Manganese ..... 1.02 per cent

With aluminum. Quickly cooled. Magnified 450 diameters, and reduced one-half in reproduction. Unetched.

FIG. 3—STRUCTURE OF LUMP, NO. 1499

Sulphur ..... 0.302 per cent
Manganese ..... 0.76 per cent

Without aluminum. Slowly cooled. Magnified 450 diameters, and reduced one-half in reproduction. Unetched.

FIG. 4—STRUCTURE OF LUMP, NO. 1540

Sulphur ..... 0.480 per cent
Manganese ..... 1.02 per cent

With aluminum. Slowly cooled. Magnified 450 diameters, and reduced one-half in reproduction. Unetched.

Applying Scientific Management—I

An Explanation of the Purpose and Accomplishments of Scientific Management—Its Utilization in the Foundry Business

BY H. K. HATHAWAY

IN SPITE of the wide publicity that the scientific management movement has received, there is so much misunderstanding as to what scientific management really is, what its advocates aim to accomplish through its application, and how it is applied, that a brief explanation on each of these points is necessary in order that the plan I propose may have a proper background.

Scientific management must not be considered merely as a means of securing greater dividends for the stockholders, but rather as a means to the general betterment of human welfare. It is true that under present social and economic conditions, as Frederick W. Taylor said in a statement that has been misapplied by his opponents, "the chief object of any company must be the earning of profits for its owners." It is self-evident that unless this object is accomplished, sooner or later the company must fail. This is one of the objects of scientific management, but not the only one, nor was it regarded by Mr. Taylor as the greatest. Did scientific management accomplish no more than this it would be a failure, but without doing so it could not, under the existing economic system, accomplish those bigger objects upon which the earning of profits are in turn dependent. Broadly speaking, scientific management is intended to produce more wealth for a given expenditure of effort, as a result of elimination of waste in the matter of time, work and materials. Mr. Taylor in his lectures was wont to emphasize the fact that wealth in usable form only comes into existence through the efforts of those who are to enjoy it. The producer and the consumer, broadly speaking, are the same person, and by consequence any increase in production of useful articles cannot help but benefit the producer.

A French Scientist's Version

In his preface to the French edition of Mr. Taylor's book, "The Principles of Scientific Management," Mr. Henri Le Chatelier, the famous scientist, says:

Let us suppose for an instant that the belief in economic determinism has become general, and let us endeavor to unravel some of its laws. Here, for example, is the first one, extremely simple, too evident even, you will say, to be worthy even of mention:

In civilized countries men have a great desire for enjoyment, seeking all of the pleasures of life and being disposed to put forth considerable effort in order to procure them.

Restraint in civilized lands is indispensable. Often the negroes of the African tribes content themselves with the most rudimentary habitations, go without clothing, and have as their sole ambition to lead a vegetative life basking idly in the sunshine. Such countries have their own peculiar economic conditions.

On the contrary, in civilized countries, the desire to enjoy the pleasures of life, each day more numerous, to possess worldly goods in greater number, to gain more money because in exchange for money may be procured all of the enjoyments sought, is certainly the most powerful motive capable of producing activity among mankind. One is stupefied to see the amount of work that the small farmer or the workman who owns his own house will do when he is certain of not having to divide the fruits of his labor with anyone. In that lies a certain truth, an economic law. In spite of its simplicity and its self-evidence, it is not only out of place to mention it in consideration of the consequences that it entails.

Here is one of these consequences which constitutes itself a second law, no less certain than the first, but yet less generally accepted. Its importance is enormous from the workman's standpoint:

The inhabitants of any civilized country become twice as rich each time that they succeed in doubling their production because they have then each one on the average two times the things, useful or agreeable, to consume.

This truth, this law, is again so evident that there should be no need of justifying it. In a country where each inhabitant produced everything to satisfy his needs no proof would be possible; this law then would apply equally well to savage tribes as to civilized peoples. It was formerly thus in France; the peasant produced on his land the wheat necessary for his food; he next ground it and made it himself into bread. He raised also a pig which he killed and salted for his winter provisions; he cultivated flax from which he spun and wove his cloth; he hewed also the wood of which he built his house and grew the straw with which he thatched it. In increasing his production as is made possible today by the employment of agricultural machinery he has obtained a much higher return from his labor. The sale of this surplus of his production has made it possible for him to replace the hut of his fathers by a solid house of stone roofed with slate instead of straw. His installation in this luxurious abode will remain for him the greatest joy of existence and lighten all his troubles.

If our farmers and our textile workers succeed today in producing together by grace of this specialization twice the quantity of useful articles as in the past they will each be able to procure, whether directly or by exchange, twice as much as formerly, and they shall therefore have become twice as rich as formerly.

There is, however, a reservation to be made here; it does not suffice in the case of specialization, that one isolated individual should double his production in order that he may become twice as rich; it is still necessary that his neighbors should do as much, otherwise he would have no one with whom to exchange the products of his labor, which would then do him no good. There is in that an essential condition of the law of proportion between the increase of production and that of riches.

One often hears it said that increased production is not necessarily followed by increased consumption, that it is necessary to avoid exceeding the power of absorption of the consumer. In reality there is no limit to this power of absorption, at least in civilized lands, because neither is there a limit to the desire of well-being. This is a truth that it is necessary to proclaim incessantly and which everybody should be made to see.

So long as this truth is not recognized, the ideas advanced by Mr. Taylor will not be appreciated at their just valuation because their one object is to increase the productive power of every man. Machinery, although employed too often without method, has already produced enormous results in this direction. Within a century the production per man has been increased about ten-fold through this agency, and in consequence mankind is ten times richer. The methods proposed by Mr. Taylor make it possible, without any change in present machinery, to double again and in some cases to triple the production of each workman and consequently to double and triple wealth generally. How does it happen that a law so useful and so important, which should be well-known, should be so generally unrecognized and contested? The explanation must be looked for in the multiplicity of errors of human judgment. Instead of relying upon simple common sense, people are prone to enter into long calculations that are completely wrong, or on the other hand let themselves be guided by unreasoning sentiment.

A Valuable Exposition

This essay of Mr. Le Chatelier's is the clearest and best exposition of the economic importance of the scientific management movement, and one which

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A paper read at the twentieth meeting of the American Foundrymen's Association, Atlantic City, N. J., Sept. 28-Oct. 1. The author, H. K. Hathaway, is affiliated with the Tabor Mfg. Co., Philadelphia. This is the first of two installments.

ought to be read by all workmen and all employers.

Scientific management seems to be inevitable. Labor is constantly demanding a larger portion of the wealth produced; the standards of living of the great mass of the people are advancing; workmen want better homes, better clothing, better food, to raise their families in greater comfort, and to give their children better opportunities for education. In addition to these they should have enough to properly provide for their sustenance and comfort in their declining years. In short, they want higher wages. Having secured the higher wages, the next thing labor wants is more leisure for recreation, for the enjoyment of the wealth produced, and for self-development—or shorter hours.

While, at times, we may have our viewpoint twisted by local conditions, or by the means taken to secure the desired result, we must admit that there is a great deal of justice in labor's demands—as they are in fact only what we are all striving for.

Sooner or later these demands must be met. But how? No one can logically object to workmen receiving higher pay—either in the form of more dollars or lowered cost of living—nor to their working shorter hours, provided society as a whole does not suffer thereby. It must not be forgotten, however, that society is very largely composed of workmen, and that if we simply raise wages and shorten hours without correspondingly increasing production, the result will simply be to diminish the purchasing power of the dollar, as everything will cost more, and society—including the workmen—will be worse off than before.

Higher Wages and Shorter Hours

Where then are the higher wages and shorter hours to come from? An arbitrary shortening of hours without a proportionate increase in production would wipe a great many industries off the map, unless they increased selling prices to offset the higher cost. If this latter expedient is resorted to, the burden falls upon the consumer—who is in the last analysis the workingman—and he profits nothing by his apparent gain. The same is true of an increase of wages without an increase in production. You can't get something for nothing. Even if all of the profits earned by the average company were distributed among the workmen it would not make any very great difference in their pay, especially if the years devoted to the building-up of a business and years of industrial depression are taken into account.

The earning of profits is, under the existing state of affairs, essential to the life of our industrial organization. Where then lies the solution? Perhaps the first and most important thing—although it will probably be the last to be accomplished—is the stabilization of business, the wiping out of constantly recurring periods of *hard times.* This is, however, too big a subject to go into now. A more practical solution—although it will never be an absolute one as long as we have business depressions—lies in the general adoption of scientific management. The development of machinery has been the means of the great improvement in the condition of society that has taken place during the last century and a half; scientific management, which is the complement of machinery, is the next step, and will make possible the payment of higher wages and shorter hours without decreasing production or increasing cost.

Opposition to Scientific Management

Scientific management has, even as labor-saving machinery or indeed any progressive movement, met with opposition which has not by any means been confined to the workingmen or their champions.

Much of this opposition has been due to misunderstanding or to abuses committed in the name of scientific management. Misunderstanding is gradually being cleared away, but the abuse referred to is harder to cope with. A man whom I greatly admire and respect, who has spent many years in an honest and tireless endeavor to improve the condition of labor, recently wrote me as follows:

I read the debate which occurred relative to the riders attached to the Army Appropriation Bill. I feel certain that had I been in congress I would have voted in favor of them, not for any opinion that they settled the question or that they decided the merits of any question involved through scientific management, but that it would force a more thorough study of the entire question.

I do not believe that there is sufficient knowledge on the subject and I feel that those who favor or oppose scientific management must discuss their respective attitudes more thoroughly and publicly than they have, before anyone is in a position to speak a final word.

Since leaving you I have seen much which interested, amused and grieved me, and on more than one occasion I said: "If Hathaway could only see this he would have a fit and somebody would be expelled for heresy."

I found many conditions existing in plants which claim to have applied the methods of scientific management which were in direct opposition to the principles laid down by Mr. Taylor and those which you have talked over with me, and one of the most depressing facts which was most evident is that the woods are full of incompetent men and charlatans who, because the field seems to be a promising one, are out gathering in the shekels from those who have employed them. I feel that these men, who are quite large in numbers, are far more dangerous to scientific management than anything else.

I want to assure you that had you seen some of the second and third rate men whom I have watched making time studies and setting tasks, you would realize the necessity of some such step being taken as much as if you had witnessed, as I have done, the work of some men professing to be efficiency engineers and receiving comparatively enormous salaries. These men, are, without doubt, acquiring some information as they blunder along, and it is doubtful who bears the heaviest burden of their experiments, the employers or the workmen. I have seen plenty of instances where one or the other or both were being flimflammed. As one man standing fairly high among the group of those who advertise their business as efficiency engineers said to me during a conversation — "What in h—l do you think we are? There may be a whole lot of talking about our benefiting the workmen, but the employer is in business for the money and we are in the business for the money. When we feel that we are not in the business for the money that's in it, we will get out." You see it is not only what the words may imply but the spirit which lay back of it, and so long as men with such ideals are endeavoring to introduce new systems, so long is it most certain that there will be industrial friction whether the workers are organized or unorganized.

Four Basic Principles of Scientific Management

This sort of thing, of course, is an obstacle in the advancement of scientific management, but as employers and workmen learn more about the subject it will disappear. The essence of scientific management is summed up in four great principles; Mr. Taylor states the four basic principles in his book "The Principles of Scientific Management" in such a concise manner that it is not until he has studied the subject exhaustively and become quite familiar with it through intimate contact that the average person grasps their full meaning and importance. These basic principles are as follows:

1.—The development of a science in place of "rule-of-thumb" knowledge. This means scientific investigation and study; the collection and codification of data and their reduction to laws. In this *time study* plays an obviously important part.

2.—The scientific selection and training of the workman in place of workmen being employed as a result of expediency, necessity, or mistaken personal preference on work for which they may be physically, temperamentally, or mentally unsuited; or, as Mr. Taylor expresses it, "in the past he (the workman) chose his own work, and trained himself as best he could." Improper selection of the workman has resulted in many *square pegs in round holes.*

3.—Hearty co-operation between the management and the men, so as to insure all work being done in accordance with the principles of the science which has been developed.

4.—An almost equal division of the work and responsibility for results between the management and the workmen, the management taking over all of the work for which they are better fitted than the workmen; in the past almost all of the work, and the

greater part of the responsibility were thrown upon the men as a regular part of their work.

Important as these principles may be, it is not enough to simply set them forth. While they may be applied by anyone in any undertaking employing a number of people without any formally laid down system, if they are to be consistently and permanently adhered to not, and you wish to become so, I must refer you to Mr. Taylor's book, "Shop Management" and certain articles which you will find reprinted in a book on scientific management published by the Harvard University Press.

In conjunction with reading the books referred to, those who are sufficiently interested would get a still better understanding by visiting one or more of the plants where this system is in operation demonstrated that it could be done. That scientific management may be profitably applied to the operation of a foundry is, so far as the writer knows, still to be demonstrated.

In certain quarters this statement may be questioned. I have no doubt that some of you have heard of cases where scientific management has actually been tried, and proved a failure. Others may know of foundries which claim to be successfully operating under scientific management; and I have no doubt that a considerable portion of my readers will admit freely and without wasting time or argument that it may work all right in a machine shop, but that it won't work profitably in their business. From this it must not be presumed

Time Study Covering Three Days' Work in a Foundry

Fifth Day

Started with "Angelo" and "John," both new to their jobs.

A. M.	A. M.	
7:00 to	7:40	Cutting sand.
7:40 to	7:47	John to toilet.
7:47 to	8:35	16 drags made. About 2 minutes, 43 seconds each.
*8:35 to	8:38	Angelo gets slick from old place in shop.
*8:38 to	8:40	Both men get blacking from benches in foundry.
8:40 to	9:05	Patching and blacking 16 drags.
9:05 to	9:09	One man sets 16 small cores while other man continues to patch and black.
*9:09 to	9:10	One man gets fresh supply of blacking, while other continues to finish molds.
9:10 to	9:17	Both men nail 15 small cores with 2 nails each.
9:17 to	9:25	Both men set 11 large cores and vent each one at 5 points.
9:25 to	9:32	Changing pattern board.
*9:32 to	9:33	Getting vent wire on account of not understanding that this was not necessary.
9:33 to	9.43	Making first cope. Learning where nails were to be set, etc.
9:43 to	9:50	Adjusting pouring basin on pressure block.
9:50 to	10:20	Making 3 more copes.
*10:20 to	10:23	John gets clay and mixes it in clay wash for nails.
10:23 to	11:08	Ten more copes made. 4 minutes, 30 seconds per cope.
11:08 to	11:18	Two more copes made.
11:18 to	11:50	Finishing copes.
11:50 to	11:55	John left for somewhere.
11:55 to	12:00	Finishing copes.
P. M.	P. M.	
1:00 to	1:55	Finishing and setting five cores in drags.
1:55 to	2:00	Blacking and blowing out molds.
2:00 to	2:07	Tipping up copes and cleaning out basins.
2:07 to	2:21	Closing 16 molds.
*2:21 to	2:26½	Getting facing sand.
2:26½ to	2:28	Changing pattern.
2:28 to	2:31	Getting bull ladle and building fire in it.
2:31 to	3:00	Making 8 drags.
3:00 to	3:03	Changing pattern board.
*3:03 to	3:28	Trouble with pattern. Lost three molds and finally saved one by careful patching. Allow 6 minutes machine time.
*3:28 to	3:40	Patching eight drag molds.

Molds made 20½. Time on machine, 3 hours, 11 minutes. Average about 6½ molds per hour.

Sixth Day

"Angelo" and "Luigi," both new to their jobs. On previous day Angelo worked on opposite side of machine.

Started work with 8 drags and 1 cope on the floor.

A. M.	A. M.	
7:00 to	7:30	Cutting sand. (10 minutes less than on day before).
7:30 to	8:04	Seven copes made.
8.04 to	8:30	Finishing these 7 copes.
8:30 to	8:38	Closing 8 molds.
8:38 to	8:42	Changing pattern.
8:42 to	9:27	Making 15 drags, 3 minutes each.
9:27 to	9:41	Finishing these drags.
9:41 to	9:47	Adjusting block on ramming head.
9:47 to	10:06	Making 3 copes.
10:06 to	10:20	Making 3 more copes.
10:20 to	11:10	Seven copes made.
*11:10 to	11:20	Trouble with flasks not fitting pattern board.
11:20 to	11:29	Two copes made.
11:29 to	12:00	Finishing these copes.
P. M.	P. M.	
*1:00 to	1:35	Finishing copes. No cores at hand as promised.
1:35 to	1:45	Luigi gets more black sand. Angelo continues to finish molds.
*1:45 to	1:55	Luigi (new man) spoils cope. Angelo patches it.
1:55 to	2:00	Removing basin from pressure block on machine.
2:00 to	2:32	Making 10 drags.
2:32 to	3:00	Closing molds.
3:00 to	3:30	Making 5 copes.
3:30 to	3:40	Closing same.

Twenty-eight molds closed on floor and six extra drags and one extra cope which could not be closed because of flask pins.

Molds made, 26. Time on machine, 4 hours, 13 minutes. Average about 6.2 molds per hour.

Seventh Day

A. M.	A. M.	
7:00 to	7:30	Cutting sand.
*7:30 to	8:15	Cleaning out sand under machine.
8:15 to	10:13	Forty-four drags made.
*10:13 to	10:40	(Allow 3 minutes machine time). Grinding corners of pattern board and adjusting pattern board in place.
10:40 to	12:00	Making 23 copes.
P. M.	P. M.	
1:00 to	1:20	Angelo and Luigi make 2 copes.
1:20 to	3:00	Twenty-six more copes finished. Trouble and delay all through this time because the flasks that were brought to machine did not fit pattern board.

50 open molds on floor.

Molds made, 46½. Time, 5 hours, 21 minutes. Average about 8.7 molds per hour.

Average time for various half molds made. These times can be considerably reduced by practice:

	Time Each Minutes	Seconds
Pattern "A" Drags	2	43
Pattern "A" Copes	4	30
Pattern "B" Drags	3	35
Pattern "B" Copes	4	54
Pattern "C" Drags	2	37
Pattern "C" Copes	4	8

I believe these times can be reduced to an average of three minutes per half mold.

The items marked * indicate points at which production was lost through faults over which the workman had no control. A more minute and properly made time study with a sufficient number of observations—such as will be shown later—would have probably indicated numerous small difficulties which if corrected, would result in considerable gain in output.

a properly devised and installed mechanism becomes a necessity. To the development of such a mechanism Mr. Taylor devoted the greater part of his life.

Time will not permit of any detailed description of the system developed, the form of which varies in different industries. I must take it for granted that you are already familiar with it, and if

In discussing the application of scientific management to the foundry, I feel something as Columbus must have felt in his endeavors to interest the people of his time in the theory that another continent lay at the opposite side of the globe and that by sailing due west he would reach it. No one had ever

that foundrymen have not given much study and effort to the subject of increasing efficiency, or that nothing has been done in the matter of systematizing foundry operation, but that so far such efforts have been sporadic and have not been carried on in a manner which would have, in the eyes of the late Frederick W. Taylor or those who were closely associated with him in the great cause to which he devoted his life, merited the name of scientific management in the same sense as would the accomplishments in other branches of industry.

In dull times, such as prevailed almost generally throughout the foundry industry during the past two years—when most plants ran only three or four days per week with a reduced number of workmen—any proposition to increase production will fall on deaf ears. In such times all that may be accomplished is to reduce the direct labor cost through producing enough more work in a given time. A part of this saving must go to the worker as his just recompense for the part he plays in effecting it, and another part must defray the cost of creating and maintaining those improved conditions in the absence of which the workman could not turn out the increased amount of work. Such saving as may remain under the circumstances is not sufficient, in view of the increased percentage of fixed charges and other indirect expenses due to decreased business, to justify the expense of developing and installing the requisite system of scientific management. In busy times such as we have known in the past and such as seem now to be before us the problem is how to fill orders.

When the existing plant becomes insufficient to handle the business there are two ways to proceed: The most common and most obvious thing to do would be to make an addition to the plant, but there may be some difficulty in financing such a venture and land may not be available, but assuming that these obstacles do not exist there is still a greater objection than either of them, namely the increase in plant necessary to take care of the business that may be secured in boom times adds just so much burden to be borne in dull times.

Taylor System Tentatively Applied to a Jobbing Foundry

I shall now very briefly outline a tentative plan for the application of the Taylor system, having in mind a large jobbing foundry.

At this point it might be well to point out that the system or mechanism for the application of the principles of scientific management differs widely in different industries, and even in different plants operating in the same industry.

The development of a system suitable for each of the different classes of foundries is something that may only be done on the ground under working conditions. Today I doubt, if a company decided to install the Taylor system, that it would be possible to find a man to undertake the work possessing the necessary knowledge of foundry practice and at the same time a sufficiently profound knowledge of scientific management, to say nothing of the experience, ability and temperament upon which its successful installation depends. It might be done in one of two ways: By an experienced foundryman working in conjunction with an experienced management engineer, or possibly by an experienced foundryman—possessing the right qualifications—taking two or three years to train himself; this period to be spent in other industries in which the Taylor system is in operation.

Ramifications of System

In a foundry we would have, in common with other industries, to establish a planning department, a stores system, a tool room; equipment would have to be put in good condition, standards established, and provision made for maintaining the standards. The work of the planning department would include, in addition to the ordinary clerical functions, inspection and repair of patterns received, and should have the necessary floor space and equipment for this. Patterns to be used would be brought to the planning department, inspected, and such minor repairs made as might be necessary. Next the work of molding would be planned and instruction cards written. In this connection the flask to be used would be looked up, cores ordered, and provision made for having on hand all rigging before issuing an order for the actual molding of the job, so that when the time came everything necessary could be delivered to the molders' floor in good working order. The planning would include determining whether or not the job should go on a molding machine—if so, which machine—and the fitting up of the pattern for the machine decided upon. The man performing this function would necessarily have to be a thoroughly skilled and practical man. The need of a tool room has long been recognized in machine shops even where no claim is made to the application of scientific management, but without a properly organized and equipped tool room scientific management would be almost impossible of application.

In a foundry under this system the tool room would be fully as important a factor as in a machine shop. The tool room would have charge of the storage and issue of all flasks, as well as repair and alteration of them. It should be able at any time to tell just what flasks are in use, what are available, and where located. It should be able to supply all small tools, such as rammers' trowels, shovels, brushes, etc., and should be responsible for the inspection and repair or replacement of those tools which would constitute the molder's regular equipment.

Some effort has been made to work along these lines; that is, to have patterns looked over and fixed up, and proper flasks and other equipment supplied in advance of work being given to the molder, even in foundries making no pretense to scientific management; but it is very difficult without organization and system to have it done consistently. Such things, it may be said, should be done by any competent foreman, but when one considers the multiplicity of duties falling upon the foreman of a foundry it is a great compliment to him that he succeeds in keeping the foundry running at all.

I know from experience that in a machine shop it is a physical impossibility for a foreman to do one-half of what is expected of him, and from what I have seen of foundries, the machine shop foreman has an easy job compared to his brother in the foundry.

To illustrate the importance of these points the following instances are cited. In one foundry I saw a flask measuring about 5 x 8 feet and 3 feet deep placed on a jarring machine, filled and rammed up in a remarkably short time, and then left standing on the machine 20 minutes while the molder and his two helpers went in quest of clamps and wedges to secure the bottom board; they would not have taken so long except that the first man whose clamps they stole caught them just as they were putting them on, making it necessary to start the hunt all over again.

Lose Time in Repairs

It is not infrequent that one sees a pattern sent to the foundry in such a battered condition that it cannot be drawn without so badly damaging the mold as to require more time in patching than the whole operation should take.

The man running a jobbing foundry is naturally reluctant to spend money fixing up someone else's patterns, but it is my firm belief that he would profit by employing a first-class pattern maker to regularly go over and fix up every pattern before it goes to the molder. Such things as this, and going over flasks to make sure that pins and bars are all right, seeing that bottom boards, clamps, gaggers, chaplets, etc., are provided, could probably be done to a greater extent

(*Continued on page 764b*)

Furnace for Making Steel From Ore

Description of a New Type of Melting Medium Which Has Been Developed in Germany

A FURNACE for the direct production of steel from ore has been designed recently by Karl Otto, a German engineer. The general construction of the furnace is shown in the accompanying illustrations. The method of operation is somewhat similar to the step-process on which John T. Jones, Iron Mountain, Mich., has been experimenting for a number of years.

A plan and cross section of the Otto furnace are shown in Figs. 1 and 2. It is carried on trunnions and has a sheet steel jacket with fire brick lining. The furnace, which is furnished with a preheater *II*, and a gas producer *III*, is closed with the cover *E*. The upper half of the melting chamber is lined with tile and the lower half with garnet, *D*, which reaches into the slag chamber *K*, through the plate *P*. The melting chamber is covered by a perforated plate or cap.

Air is forced into the preheater *II* from a compressor, the waste heat from the furnace entering through the flue *2*. After the waste gases have passed through the preheater they are led to the outer air through *4*. Some of the compressed air is led by the pipe line *5* into the closed producer, which is charged with coal. The gas from the producer passes through the pipe *6* and the hollow trunnion *M* into the furnace, and is led through the pipe *F* to the burners *B*. At this point the gas meets the hot blast which passes through the hollow trunnion *Z*, and the pipe lines *G*. If a porous tile wall is provided in front of the tuyeres or jets, a flameless surface combustion results. Combustion begins when the electric lighter *L* is charged.

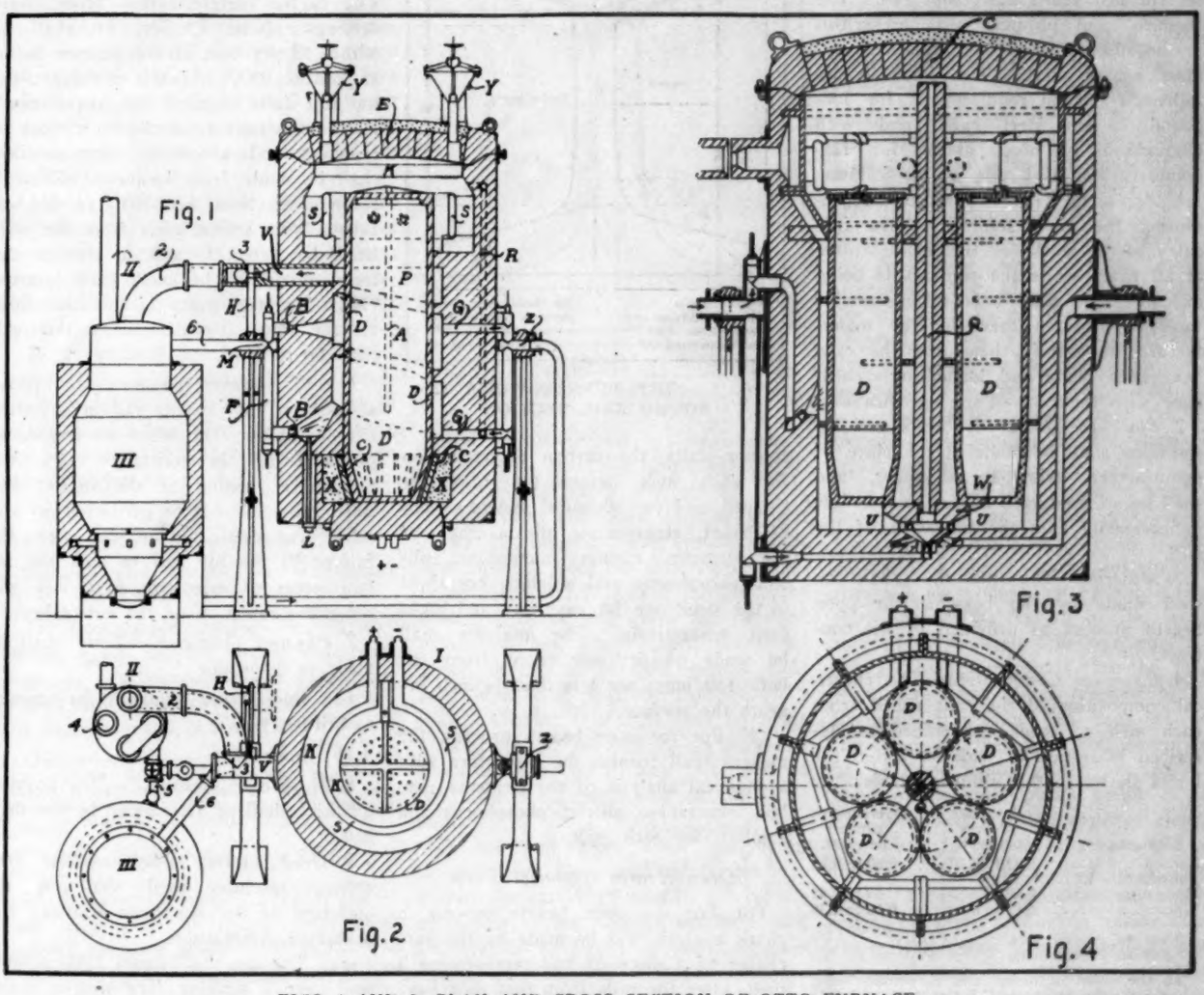
The reducing chamber *D* is lined with tile rings or specially shaped bricks. It is surrounded by a jacket containing the exhaust gases which are afterward led through *V* into the preheater.

After loosening the clamps, the cover *E* is raised and the chamber *D* is charged with steel scrap or high grade pig iron. The finer broken ore which is to be reduced, is mixed with wood or peat charcoal and charged into the upper portion. The cinder chamber *K* is filled with low grade coke or porous coal. Screenings from anthracite coal, bituminous or peat coke are satisfactory.

The furnace being closed, the blast is turned on and the gas formed in the producer is lighted at the burners, com-

(*Continued on Page* 764b.)

This article appeared originally in *Die Metallarbeiter*, Germany, and was translated especially for *The Iron Trade Review*.



FIGS. 1 AND 2—PLAN AND CROSS SECTION OF OTTO FURNACE
FIGS. 3 AND 4—PLAN AND CROSS SECTION OF FURNACE WITH FIVE MELTING CHAMBERS

Design New 125-Pound Rail Section

Pennsylvania Railroad Engineers Embody the Results of Two Years' Tests in New Specifications for Carbon Steel Rails

NEW specifications for carbon steel rails, the result of previous experience and of two years' tests of small lots rolled in various mills, have been completed by the Pennsylvania railroad, which has also evolved a design for a new 125-pound rail section. As illustrated in Fig. 1, this section is 6½ inches high with a base 5½ inches wide. The head is 3 inches wide, its top radius being 12 inches and its sides vertical. Specifications for the 100-pound rail, given below, differ from those for the new 125-pound rail only in that they require chemical tests to be made from the completed rail, the latter thus omitting sections 6 (c), 6 (d), and 6 (e). The carbon limits for the new heavy rail are set at 0.68 to 0.82 per cent, or 10 points lower than those set for last year's 125-pound rail. The chemical and physical tests prescribed in the specifications cover bessemer and open hearth steel. The Pennsylvania railroad's present requirements for 100-pound carbon steel rails, and with eliminations as noted above, for 125-pound carbon steel rails, are as follows:

1. *Access to Works.*—Inspectors representing the purchaser shall have free entry to the works of the manufacturer at all times while the contract is being executed, and shall have all reasonable facilities afforded them by the manufacturer to satisfy them that the rails have been made and loaded in accordance with the terms of the specifications.

2. *Place for Tests.*—All tests and inspections shall be made at the place of manufacture prior to shipment, and shall be so conducted as not to interfere unnecessarily with the operation of the mill.

3. *Material.*—The material shall be steel made by the bessemer or open hearth process, as provided by the contract.

4. *Chemical Composition.*—The chemical composition of the rails rolled from each melt of steel, determined as described in section 6, shall be within the limits shown in the following table:

Elements.	Bessemer process per cent.	Open hearth process per cent.
Carbon	0.45 to 0.10	0.60 to 0.75
Phosphorus	*	†
Manganese	0.80 to 1.10	0.60 to 0.90
Silicon	0.05 to 0.20	0.10 to 0.30

†Not to exceed 0.04.
*Not to exceed 0.55.

In the event of nickel and chromium being present to the extent of 1.0 per cent and 0.35 per cent, respectively, these elements will be considered as the equivalent of 0.07 per cent of carbon in the above requirements. When the analyses for carbon by the mill chemists and by the railroad chemists do not agree, a tolerance of two points below the minimum or two points above the maximum will be allowed to cover such variation before condemnation.

5. *Average Carbon.*—It is desired that the percentage of carbon in an entire order of rails shall average as high as the mean percentage between the upper and lower limits specified.

6. *Analyses.* — In order to ascertain whether the chemical composition is in accordance with the requirements, analyses shall be furnished as follows:

(*a*) For the bessemer process, the manufacturer shall furnish to the inspector daily, the carbon determination for each melt before the rails are shipped, and two chemical analyses every 24 hours, representing the average of the elements, carbon, manganese, silicon, phosphorus and sulphur, contained in the steel, one for each day and night turn, respectively. The analyses shall be made on drillings taken from the ladle test ingot not less than ⅛-inch beneath the surface.

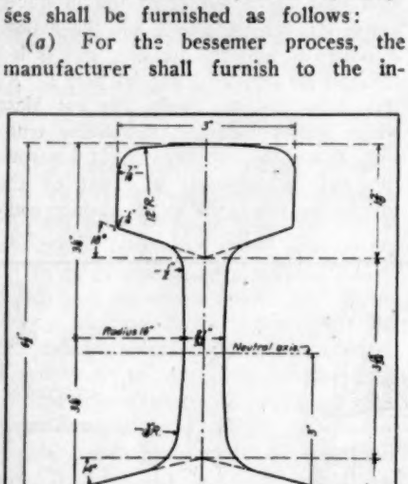

3"
Radius 12"
Neutral axis
5½"
Area = 12.15 sq. in.
Weight = 123.8 lbs. per yard
Moment of Inertia, 68.7
Sec. Modulus head, 19.6
Sec. Modulus base, 22.9
Area head, 4.73 sq. in. = 38.9%
" web, 3.47 " " = 28.5%
" base, 4.95 " " = 38.3%

FIG. 1 — THE PENNSYLVANIA 125-POUND RAIL SECTION

(*b*) For the open hearth process, the makers shall furnish the inspectors with a chemical analysis of the elements, carbon, manganese, silicon, phosphorus and sulphur, for each melt.

Open Hearth Chemical Tests

(*c*) For the open hearth process, a check analysis will be made by the purchaser of a piece of rail representing a melt, after the rails from that melt have passed the physical requirements. On request of the inspector, and in his presence, the manufacturer shall furnish from one of the drop-test pieces (Sec. 10) representing the melt, drillings satisfactory to the inspector, taken with a ⅝-inch flat drill, parallel to the axis of the rail, at a point one-third of the distance from the upper corner to the center of the head, as shown in location "O," Fig. 2. The analysis from these drillings shall conform to the chemical requirements specified in section 4, and failure to meet these requirements shall be sufficient cause for the rejection of the entire melt.

(*d*) For the open hearth process, after the rail has passed the physical requirements, additional drillings will be taken from the same rail, and in the same manner as specified in section 6 (*c*), at the junction of the head and web, as shown in location "M," Fig. 2. The carbon determination from these drillings (Note 2, Sec. 4) shall be within 12 per cent of the amount found at location "O." If the test from the top rail fails to meet this requirement, all the top rails from the melt shall be rejected, and a similar determination shall be made from location "M" of a second rail (Note, Sec. 10). If this test fails all the second rails from the melt shall be rejected, and a similar determination shall be made from location "M" of a third rail. If this test fails, all the remaining rails from the melt shall be rejected.

(*e*) If, however, the segregation found at location "M" in any rail in a rolling exceeds 25 per cent, when determined as provided for in section 6 (*d*), the progressive testing of the second and third rails will not be permitted on any subsequent melts; but on such melts the failure of the top rail to pass the requirements provided for in 6 (*d*) will cause the rejection of the entire heat.

7. *Physical Qualities.* — Tests shall be made to determine:

(*a*) Ductility or toughness as opposed to brittleness.

(*b*) Soundness.

8. *Method of Testing.* — The physical qualities shall be determined by the drop test.

9. *Drop Testing Machine.*—The drop testing machine used shall be the standard of the American Railway Engineering Association.

(*a*) The tup shall weigh 2,000 pounds, and have a striking face with a radius of 5 inches.

(*b*) The anvil block shall weigh

20,000 pounds, and be supported on springs.

(*c*) The supports for the test pieces shall be spaced 3 feet between centers, and shall be a part of, and firmly secured to, the anvil. The bearing surfaces of the supports shall have a radius of 5 inches.

10. *Pieces for Drop Test.*—Drop tests shall be made on pieces of rail not less than 4 feet and not more than 6 feet long. These test pieces shall be cut from the top end of the drop rail of the ingot, and marked on the base with gage marks 1 inch apart for 3 inches inside of the center of the test piece, for measuring the ductility of the metal.

Note.—Where it is necessary to test rails lower than the first rail, the bottom of the first rail, in lieu of the top of the second rail; and the bottom of the second rail, in lieu of the top of the third rail, will be accepted, if preferred by the manufacturer.

11. *Temperature of Test Pieces.*—The temperature of the test pieces shall be between 60 and 120 degrees Fahr.

12. *Height of Drop.* — The test piece shall be placed head upwards on the supports, and be subjected to impact of the tup falling free from a height of 18 feet.

13. *Elongation or Ductility.*—(*a*) Under this impact the rail under one or more blows shall show at least 6 per cent elongation for 1 inch, or 5 per cent each for two consecutive inches of the 6-inch scale, marked as described in section 10.

(*b*) A sufficient number of blows shall be given to determine the complete elongation of the test piece of at least every fifth melt of bessemer steel, and of one out of every three test pieces of a melt of open hearth steel.

14. *Permanent Set.* — The permanent set for No. 1 classification rails, measured by the middle ordinate in inches in a length of 3 feet, after one blow under the drop test, shall not exceed that in the following table:

	——Rail——		Permanent set in inches.	
Section.	Weight per yard.	Moment of inertia.	Bessemer process.	Open hearth process.
P. S.	100	41.9	2.00	2.00

15. *Test of Destruction.* — The test pieces which do not break under the first or subsequent blows shall be nicked and broken, to determine whether the interior metal is sound.

(The words "interior defect" in the following sections shall be interpreted to mean: Seams, laminations, cavities or interposed foreign matter made visible by the destruction test, the saws, or the drills.)

Drop Tests of Bessemer Rails

16. *Bessemer Process Drop Tests.*—One piece shall be tested from each melt of bessemer steel.

(*a*) If the test piece does not break at the first blow and gives the required elongation (Sec. 13), all of the rails of the melt shall be accepted as No. 1 or No. 2 classification, according as the permanent set is less or more, respectively, than the prescribed limit, provided that the test piece, when broken, does not show interior defect.

(*b*) If the test piece breaks at the first blow, or does not give the required elongation (Sec. 13), or if the test piece does not break and gives the required elongation, but, when broken, shows interior defect, all of the top rails from that melt shall be rejected.

(*c*) A second test shall then be made of a test piece selected by the inspector from the top end of any second rail of the same melt, preferably of the same ingot (Note, Sec. 10). If the test piece does not break at the first blow and gives the required elongation (Sec. 13), all of the remainder of the rails of the melt shall be accepted as No. 1 or No. 2 classification, according

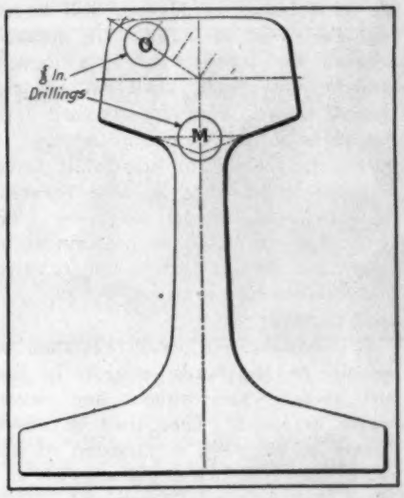


FIG. 2—SECTION OF RAIL SHOWING TEST BORINGS

as the permanent set is less or more, respectively, than the prescribed limit, provided that the test piece, when broken, does not show interior defect.

(*d*) If the test piece breaks at the first blow, or does not give the required elongation (Sec. 13), or if the test piece does not break and gives the required elongation, but, when broken, shows interior defect, all of the second rails from that melt shall be rejected.

(*e*) A third test shall then be made of a test piece selected by the inspector from the top end of any third rail of the same melt, preferably of the same ingot.

If the test piece does not break at the first blow and gives the required elongation (Sec. 13), all of the remainder of the rails of the melt shall be accepted as No. 1 or No. 2 classification, according as the permanent set is less or more, respectively, than the prescribed limit, provided that the test piece does not show interior defect.

(*f*) If the test piece breaks at the first blow, or does not give required elongation (Sec. 13), or if the test piece does not break and gives the required elongation, but, when broken, shows interior defect, all of the remainder of the rails from that melt shall be rejected.

Character of Open Hearth Physical Test

17. *Open Hearth Process Drop Tests.*—Test pieces shall be selected from the second, middle and last full ingot of each open hearth melt, and all three pieces shall undergo the complete set of physical tests.

(*a*) If none of the test pieces break at the first blow and give the required elongation (Sec. 13), all of the rails of the melt shall be accepted as No. 1 or No. 2 classification, according as the permanent set is less or more, respectively, than the prescribed limit, provided that the test pieces, when broken, do not show interior defect.

(*b*) If any of the test pieces break at the first blow, or do not give the required elongation (Sec. 13), or if none of the test pieces break and give the required elongation, but, when broken, show interior defect, all of the top rails from that melt shall be rejected.

(*c*) Second tests shall then be made from three test pieces selected by the inspector from the top ends of any second rails of the same melt, preferably the same ingots (Note, Sec. 10). If none of the test pieces break at the first blow and give the required elongation (Sec. 13), all of the remainder of the rails of the melt shall be accepted as No. 1 or No. 2 classification, according as the permanent set is less or more, respectively, than the prescribed limit, provided that the test pieces, when broken, do not show interior defect.

(*d*) If any of the test pieces break at the first blow, or do not give the required elongation (Sec. 13), or if none of the test pieces break and give the required elongation, but, when broken, show interior defect, all of the second rails of the melt shall be rejected.

(*e*) Third tests shall then be made from three test pieces selected by the inspector from the top ends of any third rails of the same melt, preferably of the same ingots (Note, Sec. 10). If none of the test pieces break at the first blow and give the required elongation (Sec. 13), all of the remainder of the rails of the melt shall be accepted as No. 1 or No. 2 classification, according as the permanent set is less or more, respectively, than the prescribed limit, provided that the test pieces, when broken, do not show any interior defect.

(*f*) If any of the test pieces break at

the first blow, or do not give the required elongation (Sec. 13), or if none of the test pieces break and give the required elongation, but, when broken, show interior defect, all of the remainder of the rails from that melt shall be rejected.

18. *No. 1 Rails.* — No. 1 classification rails shall be free from injurious defects and flaws of all kinds.

19. *No. 2 Rails.* — (*a*) Rails which, by reason of surface imperfections, or for causes mentioned in sections 16, 17 and 29, are not classed as No. 1 rails, will be accepted as No. 2 rails, but No. 2 rails which contain imperfections in such number or of such character as will, in the judgment of the inspector, render them unfit for recognized No. 2 uses, will not be accepted for shipment.

(*b*) No. 2 rails to the extent of 5 per cent of the whole order will be received. All rails accepted as No. 2 rails shall have the ends painted white and shall have two prick punch marks on the side of the web near the heat number near the end of the rail, so placed as not to be covered by the splice bars.

20. *Quality of Manufacture.*—The entire process of manufacture shall be in accordance with the best current state of the art. Ingots shall be kept in a vertical position until ready to be rolled, or until the metal in the interior has had time to solidify.

21. *Bled Ingots.* — Bled ingots shall not be used.

22. *Discard.*—There shall be sheared from the end of the bloom formed from the top of the ingot sufficient metal to secure sound rails.

23. *Lengths.*—The standard length of rails shall be 33 feet, at a temperature of 60 degrees Fahr. Ten per cent of the entire order will be accepted in shorter lengths varying by 1 foot from 32 to 25 feet. A variation of ¼ inch from the specified lengths will be allowed, except that for 15 per cent of the order this variation may be ⅜ inch. No. 1 rails less than 33 feet long shall be painted green on both ends.

24. *Shrinkage.*—The number of passes and speed of train shall be so regulated that on leaving the rolls at the final pass the temperature of the rail will not exceed that which requires a shrinkage allowance at the hot saws, for a rail 33 feet in length, of 6¼ inches.

25. *Cooling.*—The bars shall not be held for the purpose of reducing their temperature, nor shall any artificial means of cooling them be used after they leave the finishing pass. Rails, while on the cooling beds, shall be protected from snow and water.

26. *Section.*—The section of rails shall conform as accurately as possible to the template furnished by the railroad company. A variation in height of 1/64-inch less or 1/32-inch greater than the specified height, and 1/16-inch in width of flange, will be permitted; but no variation shall be allowed in the dimensions affecting the fit of the splice bars.

27. *Weight.*—The weight of the rails specified in the order shall be maintained as nearly as possible, after complying with the preceding section. A variation of ½ of 1 per cent from the calculated weight of section, as applied to an entire order, will be allowed.

28. *Payment.*—Rails accepted will be paid for according to actual weights.

29. *Straightening.* — (*a*) The hot straightening shall be carefully done, so that gagging under the cold presses will be reduced to a minimum. Any rail coming to the straightening presses showing sharp kinks or greater camber than that indicated by a middle ordinate of 4 inches in 33 feet, will be at once classed as No. 2 rail. The distance between the supports of rails in the straightening presses shall not be less than 42 inches. The supports shall have flat surfaces and be out of wind.

(*b*) Rails heard to snap while being straightened shall be at once rejected.

30 *Drilling.*—Circular holes for joint bolts shall be drilled to conform accurately in every respect to the drawing and dimensions furnished by the railroad company.

31. *Finishing.*—(*a*) All rails shall be smooth on the heads, straight in line and surface, and without any twists, waves or kinks. They shall be sawed square at the ends, a variation of not more than 1/32-inch being allowed, and burrs shall be carefully removed.

(*b*) Rails improperly drilled or straightened, or from which the burrs have not been removed, shall be rejected, but may be accepted after being properly finished.

(*c*) When any finished rail shows interior defects at either end or in a drilled hole the entire rail shall be rejected.

32. *Branding.*—Rails shall be branded for identification in the following manner:

(*a*) The name of the manufacturer, the month and year of manufacture, and the weight and types or section of rail shall be rolled in raised letters and figures on the side of the web. The type shall be marked by letters which signify the name by which it is known as for example:

Sections of Penn. R. R. System	P. S.
Sections of Am. Soc. of Civ. Engr.	A. S. C. E.
Sec. of Am. Railway Assn.	R. A.—A.
	R. A.—B.
Sec. of Am. Ry. Engrg. Assn.	R. E.

(*b*) The number of the heat and letter indicating the portion of the ingot from which the rail was made shall be plainly stamped on the web of each rail where it will not be covered by the joint bars. The top rails shall be lettered "A" and the succeeding ones "B," "C," "D," etc., consecutively; but in case of a top discard of from 20 to 35 per cent the letter "A" will be omitted, the top rail becoming "B." If the top discard be greater than 35 per cent the letter "B" shall be omitted, the top rail becoming "C."

(*c*) Open hearth rails shall be branded or stamped "O.-H." in addition to the other marks.

(*d*) All markings of rails shall be done so effectively that the marks may be read as long as the rails are in service.

33. *Separate Classes.*—All classes of rails shall be kept separate from each other.

34. *Loading.*—Rails shall be carefully handled and loaded in such a manner as not to injure them.

Safety Suggestions

The study of safety is the study of the right way to do things and should increase efficiency.

The best safety device known is a careful man.

Teach the new man how to avoid accidents.

Any fool can take a chance. It takes brains to be careful.

Life is a slack rope between birth and death. Keep your balance. Adopt the safety habit.

The man who leaves boards with nails projecting through them is just as dangerous as the man who rocks a boat.

It's better to be careful ten thousand times than to be injured once.

All accidents have causes. There are no accidents that were to be.—From the Inland Steel Co.'s Safety Bulletin.

An eight-page folder which has been published by the Tabor Manufacturing Co., Philadelphia, illustrates and describes its portable, combination shockless jarring, roll-over and pattern-drawing molding machine. It is provided with an 8-inch straight pattern draft and will handle flasks 18 inches wide, 36 inches long and 12 inches deep, weighing not to exceed 450 pounds, with 80 pounds air pressure. Four views of the machine are included, showing the flask filled ready for jar-ramming, rolling over the mold, drawing the pattern ready to roll back and the finished mold with the pattern on the jarring machine table ready to receive another flask.

Progress in Machine Shop Methods

Advance in Edge-Tool Machining—Grinding Machine Developments—Electric Driving of Tools and Its Advantages

BY E. R. NORRIS

GREAT advances are being made in milling practice as a result of recent experiments with "stream lubrication". These experiments have shown that cutter and work can be kept cool under very high speeds and feeds by the application of a sufficient quantity of cutting compound. The compound is conveniently and effectively applied to the cutter and work by means of a hood.

Some idea of the importance of "stream lubrication" may be gathered from the following data, which has been taken from various tests. By using stream lubrication while cutting the teeth of a long pinion, it was possible to increase the speed 71 per cent and to decrease the feed 164 per cent. The speed at which keyways in chrome-nickel steel shafts were milled was increased 36 per cent and the feed 90 per cent. By the same means, the speed for milling the teeth of machinery steel sprockets was increased 86 per cent and the feed 50 per cent.

Stream lubrication is being used to advantage in cases where, owing to limited capacity of the machine, speeds and feeds cannot be increased. The following is an instance of such a case. In milling grooves to form bars of "H" shaped section, it was possible to mill 300 pieces for each grinding of the cutter—stream lubrication being used—whereas, ordinarily, the cutter had to be ground after 15 or 20 pieces.

While stream lubrication gives excellent results on steel of various kinds, it is not always satisfactory when used on cast iron. This appears to be the case where the hard skin of cast iron must be encountered at all parts of the traverse, as for instance where the cutter is wider than the surface of the casting, and the vertical edges of the casting skin are presented to the cutter at two places only, which are separated by a distance equal to the width of the casting.

Since the cutting speeds and feeds have been greatly increased, it is evident that the ratio which the handling time bears to the total time of any milling operation will be greatly increased, unless improved handling and chucking facilities commensurate with the increased cutting capacity be installed. It is also evident that the highest efficiency can be obtained from operator and machine, only when the cutting proceeds continuously. This condition may be obtained, approximately, by what has been called the "continuous" method of operation. The "continuous" method may be used where the work is of such a size and shape that a circular milling attachment or a machine having two or more revolving tables can be used. Continuous milling is employed in finishing the base plates of electric sad irons by mounting them on a circular milling attachment. This circular attachment is provided with 10 independent chucks for holding the castings, thus allowing the operator time to take out the machined castings and put in other castings while the cut proceeds.

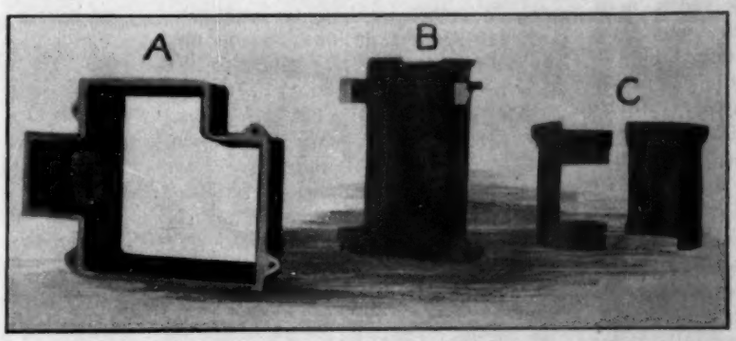


FIG. 6—CASTINGS GROUND ON HORIZONTAL DISC GRINDER

In a comparatively recent machine for continuous milling, two tables, which carry the work, revolve about a central column, the revolving and indexing being actuated by means of a foot lever. The operations of this machine are so arranged that the time for setting up the work is equal to or less than the time required to make the cut. Under these circumstances, the lost time between cuts is 10 seconds, the time required to revolve and index the tables—to which must be added, where the work is short, the time required to traverse the work to and from the cutter at the beginning and end of each cut. As an instance of the saving effected by this machine, may be cited a case where steel keys 9 inches by 1¼ inches wide, set up two at a time on each table, were milled on both faces in an average time of 3.45 minutes each; whereas the time previously required to do this work was 7 minutes each. By mounting 6 pieces on each table, the time per piece was reduced from 3.45 to 1.5 minutes each. The uses of the spline miller have been extended, so as to include curved slots and forms in endless variety, by an ingenious and inexpensive camming attachment. The attachment consists of an angle bracket which is bolted to the plate and carries a supporting roller for the cam. A face plate, or carriage, to which the work is attached slides on the angle bracket, being actuated by a small roller as it travels upon the upper edge of the cam. The pressure between roller and cam is regulated by a spring. One end of the cam is fixed up by a tap-bolt to the frame of the machine, the other end being supported by a roller. Straight slots may be produced by fixing the face plate to the angle bracket by means of a wing-nut and stud. This camming attachment has been found to be very efficient for rounding off the ends of pinion teeth.

Although the first cost of high-speed drills is much more than that of carbon-steel drills, high-speed steel is now in general use for all drills above 3/16-inch in diameter; although carbon steels are frequently preferred for the smaller sizes where the material to be drilled is chiefly brass or cast iron. There are several reasons why high-speed drills are so generally used, the first of which is undoubtedly their great cutting capacity. Carbon-steel drills are commonly used on machinery steel, with 0.005 to 0.01 inches

Second of two articles. Presented at the meeting of the International Engineering Congress, San Francisco, Sept. 20-25. The author, E. R. Norris, is director of manufacturing operations, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

feed per revolution, at a peripheral speed of 20 feet per minute, while high-speed drills are ordinarily driven at a peripheral speed of 70 feet per minute, with feeds ranging from 0.010 to 0.015 inches per revolution; and cases are on record where, under best conditions, high-speed drills have been used successfully at a peripheral speed of 135 feet per minute, with a feed of 0.06 inches per revolution. Another reason why high-speed drills are preferable is found in the saving of grinding time. Still another reason appears in the reduction of the number of drills carried in stock, for, owing to the frequent grindings necessary with carbon-steel drills, operators frequently carried three or four drills of the same size, so as to save the time which would otherwise be lost in walking to and from the emery wheel.

As in other machine tools, the adoption of high-speed steel for cutting has been followed by the redesign of the machines, due regard being paid to the element of rigidity and the power required to drive the new drills to the limits of their capacity. Belt-driven feeds have been largely superseded by spur-geared feeds, and cast iron gears have given place to cut steel and bronze gears. All important bearings are bushed with bronze. Spindles are of forged, high-carbon steel, accurately ground and fitted with ball thrust-bearings, instead of the fibre washers previously used. Automatic time saving devices have received much attention. Attachable multiple-drill heads, having adjustable centers arranged to take 2, 3, 4, 5 or 6 drills, have found many suitable applications. High-speed drills have encouraged the practice of multiple drilling, and on repetition work, multiple-drilling machines are often arranged to drill complete at one setting. The machine may be arranged for drilling in five or more directions at one time.

Grinding and Grinding Machines

Since E. G. Acheson produced the substance known as carborundum, about 25 years ago, investigators and manufacturers of abrasives have given great attention to the grain, grade and bonding of their products, with the result that today we have abrasive wheels and discs of emery, carborundum, aloxite, alundum and crystolon in great variety of size, shape, grain and grade, of superior quality, and adapted to a wide range of service.

The demand for accurately finished parts of machinery at a low cost has been largely responsible not only for the development in abrasives, but also for the great improvement in grinding machinery. Since manufacturers of machinery began to realize that abrasive discs and wheels were truly cutting instruments, in which innumerable cutting points and edges were presented to the work, much work that was previously performed on millers, planers and lathes has been transferred to the grinders.

Dry Disc Grinding Vs. Milling

Considerable saving is being effected by the use of disc grinders on many flat surfaces that were formerly milled. This is more noticeable in dealing with castings that are liable to be chilled and brittle. Grinding also possesses decided advantages where the shape of the casting or forging is such that, in order to prevent springing, great care is necessary in chucking or clamping the work in the milling machine.

Motor-driven, double disc grinders are in use, in which the discs are of steel, 23 inches in diameter and running at 1,450 revolutions per minute. The abrasive circles are glued to the discs by a cold glue, which is readily soluble in water. When the abrasive circle becomes somewhat worn, it may be used on the corners or edges of work or upon work which presents surfaces of comparatively small area, and when worn out, the abrasive circle may be removed from the steel disc by immersion in a tank of warm water. As disc grinders of this kind are invariably dry grinders, they must be connected up with a dust extracting system, and on account of the dust, it is not considered good practice to install these machines near other machinery.

In another type of disc grinder, two constant-speed motors are used, one of which is fixed on the bed, while the position of the other is adjustable along the bed by means of rack and pinion. The spindle of this latter motor, together with its grinding disc, is adjustable in a longitudinal direction and may be controlled by a micrometer stop. By this means, work having parallel surfaces may often be rapidly and accurately finished.

Instead of the abrasive circle mentioned above, ring wheels may be used with advantage for roughing off scale and stock which is too rough to be ground economically by abrasive cloth circles.

Another form of dry grinder is the horizontal type. On one machine of this kind, the disc is 48 inches in diameter and rotates at the rate of 400 revolutions per minute in a horizontal plane. This machine represents the most recent addition to the family of dry disc grinders, and is very efficient on certain kinds of work. Its chief peculiarity lies in the fact that the work bears directly on the abrasive and is ground by the pressure exerted by its own weight, hence, frail castings which are difficult to machine on the milling machines because of the tendency to spring while being clamped, may, in many instances, be faced truly and economically by this process, which requires comparatively unskilled labor. Fig. 6 shows castings which have been faced by the horizontal grinding process, and the following table shows the savings due to this method:

Name of piece.	Operation.	Time on milling mach.	Time on grinder.	Time saved, each piece.
		min.	min.	min.
Junction Box, "A"	Face	16	3	13
Controller Base, "B"	Face bosses	10	3	7
Half Bearing, "C"	Face joint	7	1¼	5¼

Wet Grinding

For the production of true flat surfaces on hardened-steel punches and dies, the vertical surface grinder has been found highly efficient. A cup wheel 16 inches in outside diameter, running at a constant speed of 1,000 revolutions per minute, is used. The work is held and presented to the wheel by means of a strong magnetic chuck, which forms the machine table; this latter has six different speeds of rotation. The feed mechanism is so graded as to allow of feeds ranging from 0.0002 to 0.005 inches in increments of 0.0002 inches. A sheet iron guard surrounds the wheel, and splash guards prevent the cutting compound from being thrown beyond the machine.

Much of the work now done on the vertical machines was formerly done on grinders of an old type, having horizontal spindles and cylindric wheels. The advantages of the vertical machine are chiefly the adjustable feeds and speeds, the method of chucking, and the face contact instead of line contact of the wheel.

In the up-keep of wheels, the vertical grinder costs five times more than the old type of horizontal machines mentioned above, but since the vertical grinder produces from 50 to 75 per cent more work, the wheel cost per die is very little more. On small dies, having surfaces up to, say, 3-inch by 6-inch, the saving due to the vertical machine is about 75 per cent; on large dies up to 30-inch diameter (the maximum capacity of the machine), the saving is about 50 per cent.

The finishing of cylindric surfaces on cast iron and steel by grinding

has been a well established machine shop process for many years. It is common practice on shaft grinding up to 6 inches diameter to use wheels of 2 inches face, and to give a work traverse of from one-half to three-fourths of the wheel width per revolution of the work. With the correct combination of work and wheel speeds, wheel grain, grade and material, each pass of the wheel, when roughing, may remove from 0.003 to 0.004 inches from the diameter of the shaft. At the end of each stroke, or pass, the longitudinal movement, or traverse, is suspended, while the work makes from one to two revolutions.

The total number of passes required to rough grind any fit, therefore, depends on the amount of stock which has been allowed for grinding. This allowance varies considerably in different machine shops according to the class of work, the condition of the roughing lathes and the inspection of the rough-turned shafting. In general, however, the amount allowed for grinding depends on the diameter and the length of the work, and tables have been constructed which give this allowance for any shaft of given diameter and length. From what has just been said, it is evident that a considerable reduction in grinding time may be effected in increasing the width of wheel. In the latest development of cylindric grinding, which some one has called "slabbing", the advantages of the very wide wheel are obtained. This new method appears to have possibilities which are limited only by the width of the grinding wheel and the rigidity of the machine. Fig. 7 shows the application of the "slabbing" process to a 1.4-inch diameter shaft, 30 inches long. It will be seen that, with the exception of one fit, the wheel exceeds the length of each shaft fit. By this means, the end traverse of wheel or work is in a large measure eliminated, and a corresponding decrease in grinding time realized.

Although for a number of years attempts at file sharpening have been made, it is only within the last few years that the process has become a commercial success. A sand blasting apparatus is being used for file sharpening, with success, by several large manufacturing establishments. This apparatus consists of a sheet-iron chamber provided with uptake, settling tank, slurry mixing-tank, slurry overflow-pipe, air agitating pipe and slurry projector. A door gives access to the inside of the chamber. The slurry projector is inclined to the horizontal at an angle of 25 degrees, and the nozzle extends slightly within the chamber. This projector consists essentially of a bronze body to which are fitted steam pipe, slurry suction-pipe and nozzle. The steam supplies sufficient water for the slurry.

The files are sharpened by being held in the slurry jet in such a manner as to expose the backs of the file teeth to the cutting action of the sand. After the file has been sharpened, it is cleaned and dried by the steam, after the slurry supply has been cut off by a foot lever. The success obtained in file sharpening depends on the skillful selection of the files to be sharpened, maintenance of the correct angle between files and jet while sharpening, and the selection of a suitable sand. Experience shows that a sharpened file often does as much work as a new one, and the cost of sharpening averages about one-fifth of the cost of new files. The following results have been obtained under ordinary manufacturing conditions and may be taken as representative of the economies which are effected by the efficient use of this apparatus:

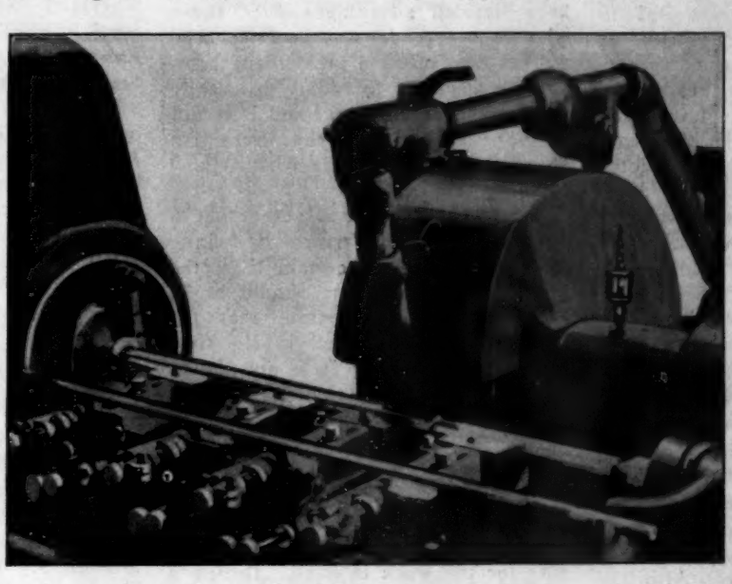


FIG. 7—SLAB GRINDING A SHAFT

No. of Files Treated.	Size. inches.	Total Cost Sand Blasting.	Recut Price.	Price of New Files.
109.....	4	$ 0.88	$.....	$ 11.99
1245.....	6	9.96	.....	136.95
1333.....	8	14.20	.....	199.95
943.....	10	15.07	56.00	149.74
1206.....	12	28.98	96.48	241.20
831.....	14	26.69	99.72	174.51
566.....	16	22.64	90.56	124.52
143.....	18	6.28	27.17	34.32

That the electrically-driven machine shop possesses advantages, is evident from the rapidity with which electric driving has been substituted for mechanical driving. Among the advantages claimed for electric driving are the following:

Power may frequently be obtained from a public supply corporation at a less cost than would be possible were it generated in a private power station. In such a case the first cost of a private generating plant is unnecessary.

Where an electrically driven shop, having its own power station, is in the vicinity of a public supply system, power may be obtained when the private station is idle.

Where electric driving is used, the position of the power house may be determined by a convenient source of fuel and water supply and facilities for the disposal of ash; whereas, mechanical transmission usually makes a definite relation of machine shop and power house imperative. Transmission shafts, counter shafts, fixings and belts, with their delays and repairs, are eliminated. As a result of the elimination of belting, there is less obstruction to light. Electrically driven machinery usually may be more easily arranged to suit the sequence of manufacturing operations, and where the machines are individually driven, any machine may be operated irrespective of others. Closer and more conveniently obtainable cutting speed regulation, with a consequent increase of from 15 to 25 per cent in output, together with a great reduction of moving parts, is usually made possible by the substitution of electric for mechanical control of machine tools.

Improved Electrical Equipment

Great improvements have been made recently in the design and construction of machine shop electrical equipment. Motors have been reduced in weight and increased in mechanical strength by the substitution of pressed steel for cast iron and cast steel. Automatic starters and controllers have been improved and are now being used to advantage on those classes of machines which are frequently started and stopped.

Among the advantages secured by automatic control—sometimes called

"push button" control—may be cited the following:

Simplicity and safety in operation;
Speed regulation to suit the hardness of material to be cut;
Protection of motor from excessive starting current;
Protection of motor from overload.

Convenient location of the push buttons greatly facilitates the setting up of work on the machine. This feature is highly desirable for planers and boring mills.

It frequently happens that existing machine tools may be readily altered and improved by the substitution of electrical for mechanical control, as in the following case: A lathe, in which the work speeds were obtained through numerous spur gears, clutches, levers and fittings, had caused considerable expense and delay due to repairs, and it was decided that a change from mechanical to electrical control should be tried, as a possible means of reducing the repair bill. Fourteen spur gears, two double clutches and their levers and fittings were removed from the headstock and an adjustable speed motor and controller were installed. After the change, instead of the nine original speeds, 32 were available under the new conditions. In addition to the advantages of closer speed regulation and reduction of wearing parts, an appreciable reduction in power used, was recorded, and speed changes were obtained with less effort.

From what has been said with reference to modern cutting tools and machinery, it is evident that rapid advances have been made in machine shop methods and equipment; it is also a fact that the cost of equipment has increased greatly. Also, the first cost of buildings, with the superior hygienic conditions under which men work; the increased cost of management due to the more highly developed and complex manufacturing conditions and competition; and other items connected with the production of machinery, all combined to swell the total overhead factory expense.

Under these circumstances, it is essential that a high state of efficiency be maintained in the machine shop, and this can be secured only when the machinery is kept running at or near its maximum capacity. There are many factors involved in the realization of this latter condition, not the least of which is the ability of the machine tool operator. In order that the operator may work to the best advantage, it is now customary in large organizations where a great many tools are used, to employ a staff of expert demonstrators, whose business it is to instruct operators and demonstrate the capabilities of machines. The demonstrator is also expected to keep himself abreast of the latest developments in his class of work, and to devise means for simplifying and improving machining operations.

The buyer of machinery is naturally influenced by the design and workmanship in the tools offered, but, generally speaking, his final decision in making a purchase will rest upon the quantity and quality of the work which the tools will produce in a definite time and under working conditions which are conducive to a reasonably long period of usefulness and efficiency. Therefore, the machine tool builders who are in a position to study the requirements of their customers and to furnish data as to how work should be done and the time in which the work can be done, have decided advantages over those who do not render such service. The market now offers a great many competitive machines for doing practically the same class of work, and it is not to be expected that the users can always accurately decide what is best for their requirements.

Before making a guarantee that a machine tool will perform a definite piece of work in a certain time, the builder of the machine should be in a position to demonstrate that the work can be performed in the time specified; otherwise, it is unsafe to make such a guarantee. Actual demonstration is convincing, and its influence as a selling agent is very far reaching. Demonstration provides a means of obtaining the most suitable arrangement of tools and the best combination of feeds, speeds, and cuts for the work in hand. During a demonstration, an itemized record, or time study, can be made of the operations, the material, the cutting feeds, speeds or cuts, the handling time and the time consumed in manipulating the machine. Such records, when conveniently filed, form a valuable source of information, which may be used to advantage when estimating the cost of similar work.

Grinding allowances vary entirely with the work being done and the machine in which it is ground. In heavy, powerful machines which remove stock rapidly, the grinding allowance may be anything from 1/64 to 1/32 inch.

Twist drill makers have decided that the best cutting angle is 59 degrees. If they had found 60 degrees equally good you can be sure they would have used it, as it is easier to measure.

Show Specifications

Robert W. Hunt & Co., engineers, Chicago, have issued six booklets devoted to various phases of their activities. The booklets discuss in detail the company's methods and organization for testing and inspecting railroad and structural material, highway bridges, creosoted timber, paving brick, cement and concrete, and also treat in detail of the company's engineering division. One of the booklets contains the standard specifications for steel rails adopted by the American Railway Association, the American Society for Testing Materials and manufacturers' standard specifications, including those of the Bethlehem Steel Co., Cambria Steel Co., Carnegie Steel Co., Colorado Fuel & Iron Co., Illinois Steel Co., Lackawanna Steel Co., Lorain Steel Co., Maryland Steel Co., Pennsylvania Steel Co., Tennessee Coal, Iron & Railroad Co. and the United States Steel Products Co. Standard specifications for Portland cement adopted by the American Society for Testing Materials are shown in a second booklet, and the standard specifications for paving brick and highway bridges approved by the same organization also are shown. Another booklet contains the standard specifications for creosoted wood blocks adopted by the Association for Standardizing Paving Specifications. These booklets are being distributed free upon application.

Hammer Drills

The Chicago Pneumatic Tool Co., Chicago, is distributing a bulletin, describing its self-rotating type of hammer drills. These are made in three sizes and are suitable for drilling 6, 8 and 12-foot holes, respectively. Among the features of these drills is that of the rotation of the steel being entirely independent of the hammer piston, eliminating the use of ratchets or pawls. This is claimed to permit more rapid drilling, as the piston is free to deliver the full force of its blow upon the drill steel without losing a part of its power through the necessity of rotating the steel as well. Another feature is the valve which consists of a standard hardened steel ball. It is ¾-inch in diameter and weighs a trifle more than an ounce. Its travel between its seats in the valve chest is only ⅛-inch.

In wet grinding the stream of water should be applied at the right spot, which is the grinding point. It should have sufficient force to keep the face of the wheel clean while in contact with the work. It is especially important on internal work.

The Importance of Personal Touch

One Way of Increasing the Efficiency of Employes—What Men Made of the Right Stuff Can Do—By One Who Used to keep Time

EVERY employer who has a real and heart-felt interest in all that is included in the three words "Safety, Sanitation and Welfare", wishes he could get into closer personal touch with his employes. Of course, if to him, safety, sanitation and welfare are merely empty words that cover a pharisaical pretense towards humanitarianism, or the chasing of fads and foibles, he has no interest in the personal touch and the employe is merely a machine with a capacity for so much output per day.

But there are good grounds to hope that employers of this type are becoming scarcer than they used to be because the evidence is accumulating to prove that the efficiency of a man to a great extent depends upon the attitude of the man toward his job. There is no doubt whatever that the average man can make himself more efficient if he wants to. How to make him want to is the real question. He can increase his output, reduce the hazard, avoid waste, and promote the general welfare if he is so inclined, but, if not so inclined, he can be a source of loss and discontent and an all-around breeder of trouble. Which kind of a man he will be depends to a great extent on his attitude of mind toward his job. Employers who are animated by "enlightened self interest" know this and are open to suggestion as to how men may be brought into such a mental attitude toward their jobs as will increase and not decrease their efficiency. The purpose of this brief paper is to make such a suggestion.

Around a mine the employe who comes most frequently into personal contact with every man on the job is the timekeeper. It goes without saying that he should be honest and accurate, but honesty and accuracy are not the only qualifications he should possess, if he is to do all that can be done in his position to promote efficiency. Mr. Neill Hutchings, of the Tennessee Coal, Iron & Railroad Co., in a little pamphlet that is excellent reading, has emphasized the necessity of courtesy and a kindly way in contrast to the short, brusque, curt manner that, unfortunately, is affected by too many timekeepers. He insists that the most dense and ignorant foreigner is entitled to courteous treatment from the timekeeper, clerks and the paymaster. They are the custodians of the fruits of his labor. He is entitled to receive at their hands that degree of courtesy and consideration that is supposed to obtain between man and man. The very fact of his ignorance and stupidity should appeal to those who are more fortunate in their mental qualifications and should be reason enough for refraining from that brusqueness, not to say brutality, that sometimes is in evidence. It is not good business to antagonize men needlessly. It is good business to conciliate them and evince toward them a manly friendliness.

Merely putting down the daily record of labor done should be but a small part of the timekeeper's usefulness. His job is one of personal touch; furthermore, he is not a boss. The superintendent is far removed. Whether he wants it or not, he is aloof from the men. The foreman, or shift boss, is to a degree the same. He wields authority. It is his business to direct, reprove and order. He must be extremely careful not to appear to play favorites. Here is where the possibility of the timekeeper's job comes in. Once or twice a day he meets each man face to face. If made of the right stuff and animated by the right motives, he can be their friend. He can learn why Mike Mickilovich is not at work, and how matters are coming along in the feud that is brewing between the Austrians and the Serbians. If there are rumblings of a gathering storm, his ear can be to the ground. If the shift boss is a tyrant, he can know it. If the men have a real grievance, he can scent it far off. If some poor fellow is carrying a burden greater than he can bear, he can at least obtain a knowledge of the load. Presumably it is this sort of information the superintendent wants, if he is the kind of superintendent that knows that the personal touch is conducive to efficiency.

But this does not imply that the timekeeper's job carries with it that of tale-bearer, or spy. It only implies that he should have human sympathy and full recognition of the rights of man; a sense of justice, and a desire to use the peculiar advantages of his position for the promotion of harmony, and for helping the superintendent with knowledge of the actual conditions as they obtain among the employes, without which the superintendent is lacking one of the factors which make toward his efficiency as a superintendent.

There is no other subordinate job around a mine that covers so much territory; that takes in the underground workings and the office; that reaches from the top of the headframe to the pump station, like that of the timekeeper. A wide-awake timekeeper has a better all-around view of the operation of a mine than many a mining engineer. Because of the chances that the job lends toward learning the operating details, it should be sought after, providing the pay is at all adequate, by men who hope to advance in the business. Because of the peculiar possibilities the job presents for usefulness other than merely keeping the timebook, men should be sought after to fill it who can bring to it all those indefinable elements of courtesy, humanity, kindness, consideration and interest in the welfare of their fellow workers which go to further that much desired, if somewhat indeterminate, and called personal touch. There would appear to be evidence enough to show that in the selection of timekeepers these other qualifications have, in some cases, been sadly overlooked, much to the detriment of that ideal of harmony and team work which every superintendent is supposed to cherish.

All of which is respectfully submitted for the consideration of superintendents when necessary to select timekeepers.

Will Make Alloys

A new plant for the manufacture of special alloy steels by the electric furnace process is to be erected at Baltimore by Henry Hess, of Philadelphia, and associates. Arrangements have been made with the United States Steel Corporation for the license to install a 6-ton Heroult furnace. Details of the complete plant have not yet been worked out, but it is understood it will comprise small bar mills, hydraulic presses for ingots, etc. Mr. Hess has been president of the Hess Steel Co., Bridgeton, N. J. and other enterprises. He has had considerable experience in the making of electric furnace steels and his Bridgeton plant was equipped with a 1-ton Stassano furnace.

Worth Bros. Co. is Taken Over

By Midvale Steel & Ordnance Co.—Wm. B. Dickson Becomes Secretary and Treasurer

ACQUISITION of the Worth Bros. Co., Coatesville, Pa., long one of the nation's most prominent plate manufacturers, and of the Coatesville Rolling Mill Co., a subsidiary interest, by the recently organized Midvale Steel & Ordnance Co., has proved to be the most interesting news contained in the latest official announcement of this new ammunition plant consolidation. It is stated that a contract has been concluded for the purchase of all the capital stock of the Worth Bros. Co., a Pennsylvania corporation, and the business of the Pennsylvania copartnership trading as the Coatesville Rolling Mill Co. The original unit of the Worth Bros. Co., the Brandywine Rolling Mills, was built in 1881 and 1882. At the present time it consists of four plate mills, including one 42 x 152-inch mill, one of the largest units of its kind in the United States. The company also owns the Valley Iron Works, Coatesville, originally built in 1837 and subsequently rebuilt, which comprises three plate mills. The steel works, which was built in 1895 and 1896, consists of 16 open hearth furnaces, including 10 50-ton and five 30-ton basic furnaces and one 35-ton acid furnace. The Coatesville Rolling Mill Co. has operated a plant for the production of iron and steel skelp and boiler tubes. The annual capacity of the rolling mills is given as 318,000 tons of plates and sheets and 30,000 tons of skelp, and of the steel works, 300,000 tons of ingots.

In addition to its rolling mills and steel works, the Worth Bros. Co. in recent years has established two modern blast furnaces, each with a production of about 500 tons daily. It is believed that the main purpose in taking over the Worth Bros. Co. by the Midvale company was to provide pig iron and open hearth steel capacity to supplement the limited steel works output of the Midvale Steel Co. The location of this latter company in the city of Philadelphia, it is thought, does not permit expansion on any considerable scale. The Milvale corporation now is placed in possession of blast furnaces and a large and modern open hearth works, and rounds out its capacity for producing from the ore on an important tonnage scale. It is announced that the new corporation has under option 300,000,000 tons of iron ore. The source from which this ore will be obtained has not yet been made public. In addition to the acquirement of the Coatesville properties, the Midvale corporation has taken over all the capital stock of the Remington Arms Co. of Delaware. This company has contracted to manufacture 2,000,000 Enfield rifles for the British government, and has erected a new plant at Eddystone, Pa., for this purpose. More than 98 per cent of the capital stock of the Midvale Steel Corporation, of Philadelphia, is embraced in the consolidation. It is stated that none of the companies taken over has any debts other than current obligations, and no bonds or mortgages or preferred stock outstanding, and that the aggregate working capital of the parent company will be in excess of $150,000,000. The new Midvale Steel & Ordnance Co., the parent unit, organized last week in Delaware, has an authorized capital stock of $100,000,000, divided into 2,000,000 shares of one class of the par value of $50. Of this capitalization, $70,000,000 has been issued to purchase the several properties and to provide working capital.

The personnel of those in the Midvale Steel & Ordnance Co. presents a notable array of banking, administrative and steel-making talent.

William Ellis Corey is president of the holding company. A. C. Dinkey, who also serves as president of the Midvale Steel Co., a subsidiary, is vice president, and Wm. B. Dickson, former vice president of the United States Steel Corporation, is secretary and treasurer. Mr. Dickson has not been active in steel manufacturing circles since he retired from the Steel Corporation in 1911. On the directorate, besides Messrs. Corey and Dinkey, are Frank A. Vanderlip, president of the National City Bank, New York City; Chas. H. Sabin, president of the Guarantee Trust Co. of New York; Albert H. Wiggin, president of the Chase National Bank of New York; Frederick H. Allen, of Lee, Higginson & Co., New York City; Ambrose Monell, president of the International Nickel Co.; Marcellus Hartley Dodge, president, director and principal stockholder of the Remington Arms Co. and of the Union Metallic Cartridge Co.; Samuel F. Pryor, vice president of the Remington Arms Co. and a director of the Baldwin Locomotive Co.; Samuel M. Vauclain, vice president and director of the Baldwin Locomotive Co.; William P. Barba, vice president and general manager of the old Midvale Steel Co. for many years, and Percy Rockefeller, son of William Rockefeller.

Mr. Corey has stated that Charles M. Schwab is not interested in the Midvale corporation.

Increases Plant Capacity

The Parish & Bingham Co., West 106th street and Madison avenue N. W., Cleveland, manufacturer of automobile bodies, pressed steel automobile frames and other sheet metal and pressed steel products, is having plans prepared by Ernst MacGregor, Leader-News building, Cleveland, for large extensions to its plant. Last week this company purchased from the Bruce-Macbeth Engine Co., a 10-acre site adjoining the plant on Madison avenue and it is on this property that the additions will be built.

Plans call for a temporary structure of wood and galvanized iron to be erected to meet the emergency of the flood of orders that has been received. This building will be 50 x 400 feet, one story, and will be used as an assembling and riveting room. Concrete foundations for heavy presses will be erected. The building will be demolished in the spring to make room for the permanent structure to be erected on this site.

No war orders have been accepted, according to A. D. Morse, secretary and treasurer of the company, though numerous opportunities have been tendered. The company is capitalized at $1,000,000. Its directors for the most part are Pittsburgh men.

Will Make Special Steel.—The Simmons Mfg. Co. has been granted a license by the United States Steel Corporation to install a six-ton electric Heroult furnace for steelmaking at its Lockport, N. Y., plant. The unit will be employed in the making of special steel, particularly for saws. This company now has in operation a one-ton Girod furnace, from which excellent results have been obtained. With the license to the Simmons Mfg. Co. and another for a six-ton unit for a new plant at Baltimore, the number of Heroult furnaces in the United States will be increased to 27.

Steady Increase

In Exports, But Machinery Movement is Not So Heavy

The statistical report of the bureau of foreign and domestic commerce for July shows a continued increase in the volume of exports, which for the first seven months of the year have been as follows, as compared with imports:

	Imports, gross tons.	Exports, gross tons.
January	10,569	139,788
February	7,505	144,363
March	8,025	174,311
April	16,564	223,236
May	28,917	262,306
June	32,201	355,396
July	20,858	378,890

While for the 12 months ending with June, 1915, the exports were somewhat less than for the similar period ending with June, 1914, the exports for the seven months ending with July were considerably larger than for the seven months ending with July, 1914. The heaviest exports are still in semi-finished material, steel bars, structural steel, sheets and plates and wire products.

IRON AND STEEL EXPORTS
GROSS TONS

	—July,—		Seven months ending July,	
	1915.	1914.	1915.	1914.
Scrap	728	3,642	21,275	27,493
Pig iron	21,859	9,371	109,040	80,381
Bil., ing., and blooms of st'l	67,121	2,955	263,985	29,899
Wire rods	16,008	347	91,071	38,827
Steel rails	31,802	9,550	126,394	119,235
Steel bars	49,523	8,163	216,367	67,743
Iron bars	6,712	556	16,038	2,763
Struc. iron				
Hoop band and steel	26,151	14,388	116,348	118,316
and scroll	2,142	846	12,213	5,775
Sh. & plates	56,410	20,760	223,920	183,902
Tin & terne plates	13,845	8,213	60,853	34,761
Barbed wire	29,985	7,073	119,549	42,893
All oth. wire	22,573	6,141	121,788	46,315
Cut nails	568	339	2,265	2,817
Wire nails	10,514	2,475	45,604	18,215
All oth. nails includ. tacks	777	212	4,443	1,605
Pipes & fit'gs	15,356	17,332	100,305	121,817
R. R. spikes	1,091	813	3,642	4,793
Bolts, nuts, riv., washers	3,011	1,280	10,121	10,016
Horseshoes	2,462	82	10,193	700
Cast radiators	252	253	1,186	2,089
Total	378,890	114,791	1,676,600	960,355

IRON AND STEEL IMPORTS,
GROSS TONS.

	July,		Seven months ending July,	
	1915.	1914.	1915.	1914.
Scrap	3,250	3,056	16,894	18,882
Pig iron	12,177	12,149	44,571	73,863
Ingots, blooms, billets of steel	815	3,610	7,547	25,987
Wire rods	205	406	2,972	5,319
Rails	3,017	1,236	43,572	9,270
Bar iron	1,136	1,602	5,222	10,419
Structural	108	671	1,027	6,194
Sh'ts and plates	79	486	692	2,850
Tin & terne pl.	71	342	2,139	13,070
Total	20,858	23,558	124,636	165,854

IRON ORE IMPORTS.

	July,		Seven months ending July,	
	1915.	1914.	1915.	1914.
Spain	.....	.....	27,008	26,060
Sweden	28,784	52,268	120,307	222,689
Canada	70	4,032	4,129	20,253
Newfoundland and Labrador	.....	.....	.....	21,015
Cuba	76,110	71,712	432,845	487,563
Oth. countries	14,504	13,826	86,750	73,303
Total	119,468	141,838	671,039	850,883

The exports of motor trucks, agricultural implements and parts of, aeroplanes and metal working machinery, including machine tools, for the past seven months have been as follows:

	Motor trucks.	Agricultural implements.	Aeroplanes.	Metal work. machy.
Jan.	$2,545,527	$429,745	$71,315	$2,903,740
Feb.	3,022,482	762,606	6,000	2,523,722
Mar.	4,725,563	1,567,327	89,450	3,863,913
April	5,240,481	1,534,715	318,492	3,300,953
May	3,971,483	1,711,379	83,950	3,762,567
June	8,578,802	854,670	283,212	3,735,562
July	6,803,001	963,534	880,836	3,872,358

The total value of machinery exports for July, 1915, was $35,891,571, compared with $10,266,981 in June, 1915, and $8,060,614 in July, 1914.

The value of zinc exports, except ore and dross, shows a slight decrease compared with June, the figures being: July, 1915, $2,584,256; June, 1915, $2,962,144; July, 1914, $26,465.

Pittsburgh Steel Co.'s Report

The Pittsburgh Steel Co., in its pamphlet report for the fiscal year ended June 30, just issued, shows net profits of $858,160, an increase of $44,609 over the previous year. The report states that owing to the unsettled conditions of general business throughout the country, and especially in the iron and steel industry, the earnings of the company from operations were not placed upon a satisfactory basis until the latter months of the fiscal year. Conditions began to improve with the beginning of the calendar year, 1915, and for the last several months of the fiscal year, orders and inquiries, satisfactory in quantity and value, were received, resulting in corresponding betterment in the operating returns.

The report states that gross sales for the fiscal year ended June 30, 1915, totaled $11,649,863, as compared with $11,024,693 the previous year, an increase of $625,170.

President Wallace H. Rowe, in his remarks to stockholders, says the operations of the company's plants at Monessen, Pa., and Glassport, Pa., were seriously handicapped during the early part of the fiscal year, due to lack of orders, increasing costs, but the management was able to retain a competent organization at all times. During this time the physical condition of the plants was improved, making it possible to meet all demands for their products to the limit of their capacity. During the year the sum of $690,818 was expended for repairs and upkeep. All departments are operating at capacity, the second blast furnace, Monessen, having been blown in June 14, 1915. The issue of $5,000,000 coupon gold notes, bearing interest at 6 per cent, by the company, President Rowe explains, was decided upon by the directors in order to consolidate current indebtedness and obtain sufficient working capital. These mature as follows: $1,500,000 Jan. 1, 1915; $1,500,000 Jan. 1, 1919, and $2,000,000 Jan. 1, 1920. In view of the improved general condition of the company and to use some available cash profitably, the directors have purchased $592,000 of the notes maturing 1918. With respect to plant depreciation the directors have decided to appropriate a proper amount annually, beginning with the present fiscal year. In order to develop ore properties operated by the subsidiary company, the Pittsburgh Steel Ore Co. has issued to $400,000 short term 6 per cent coupon gold notes. No dividends were paid on the stock during the last fiscal year, but on July 27, 1915, the directors felt warranted in declaring a dividend of 1¼ per cent on the preferred stock. President Rose concludes his remarks with the statement that the outlook for the fiscal year, beginning July 1, 1915, is promising, both domestic and export orders being quite encouraging.

A condensed statement of the company's shipments in the past two years follows:

	1914-15.	1913-14.
Pig iron, billets, bars	$1,482,439	$1,257,705
Hoops, bands, cot. ties	1,045,573	797,092
Wire rods, plain wire, etc.	8,829,394	8,728,354
Misc. products	292,457	241,542
Total	$11,649,863	$11,024,693

Awarded Prize.—The superior jury of awards at the Panama-Pacific International Exposition, San Francisco, has awarded a grand prize to the Nonpareil heat insulating materials for general excellence. These materials are manufactured by the Armstrong Cork & Insulation Co., Pittsburgh, and include Nonpareil insulating brick for industrial furnaces, ovens, boiler settings, kilns, etc., Nonpareil high pressure steam covering for high pressure and superheated steam lines, feed water heaters, etc., Nonpareil cork covering for drinking water systems, brine and ammonia lines and all cold pipes, and Nonpareil corkboard for cold storage rooms.

Looking for Nickel

Toronto, Oct. 12.—Vickers & Maxim, the noted gun manufacturers of London, Eng., are financing an exploration expedition to the Fond du Lac region lying northeast of Lake Athabasca, in northern Alberta, in search of nickel deposits which are believed to occur extensively in that country. Some months since, H. V. Dardier, a prospector, returned from Fond du Lac with rich specimens of nickel ore and went to England in order to interest British capitalists. He has been placed in charge of the expedition, which is on a large scale, comprising 25 engineers, assayers and mineralogists in addition to a large force of laborers. The party left Edmonton during the latter part of September, the object and destination being concealed after their departure. They take with them machinery valued at $50,000 and supplies costing $10,000, being prepared for a long stay in order to thoroughly prospect the region. The total cost of the enterprise will amount to fully $100,000.

Complete Great Bridge Arch

The final chord of the central steel arch of the great Hell Gate bridge spanning the East river at New York City and connecting Long Island with the mainland was placed in position Oct. 1. The central arch contains 19,000 tons of steel, spans a distance of 1,017 feet, and is the longest in the world. The two ends of the arch when brought together showed a variation of only one-quarter of an inch from the measurements of the engineers, this covering both the fabrication and the erection of the huge tonnage of steel. The American Bridge Co. hopes to complete the central construction of the bridge this winter, including the floor work. The McClintic-Marshall Co., which is building a considerable portion of the approaches, is expecting to finish its portion of the contract this year. Some of the piers for the approaches yet are to be built. The bridge and approaches complete contain about 45,000 tons of steel.

Has Big Contract

The Guarantee Trust, Inc., Boston, a $1,000,000 Massachusetts corporation, has accepted a contract from the Russian government to manufacture 2,000,000 shells, involving an expenditure of $30,000,000. It will take from one and one-half to two years to make the shells, according to the weekly output, and the officials are debating whether to spread the order among plants already equipped for the manufacture of war munitions, or to manufacture them themselves. The latter plan will probably be adopted and the trust is considering two plants within 20 miles of Boston which would be suitable. The trust is allowed three months for its preparations, and beginning Jan. 1, under the contract, it must turn out a minimum of 30,000 shells a week. The shells, which are of brass, will be filled in Ohio and will cost $15 each.

Acquires Company

Alonzo W. Whitcomb, president of the Whitcomb-Blaisdell Machine Tool Co., Worcester, Mass., since its incorporation in 1905, has disposed of his interests and retired from the company. The purchasers are Charles E. Hildreth, vice president and treasurer, and Ernest T. Clary, secretary of the company. They also purchased the stock of Miss Camilla G. Whitcomb, Worcester, and Mrs. J. F. Browning, Salem, Mass., sisters of Mr. Whitcomb, which, with that of Mr. Whitcomb, was a controlling interest in the corporation. Mr. Hildreth, who is manager of the National Machine Tool Builders' Association will probably succeed Mr. Whitcomb as president. There is a strike of 300 machinists at the plant, but it is running with a few hands. The new management announces it will be continued to be operated as an open shop and that no strike breakers will be given employment. Former employes will be taken back if they apply for work.

Manufacturers' Agent

Joseph Murcott Jr. & Co., 253 Broadway, New York City, have organized to engage in the sale of metal products in the capacity of manufacturers' agent. Recently this company was appointed eastern sales agent for the Erie-Buffalo Tube Co., Erie, Pa., manufacturer of brass and copper tubing. A specialty will be made of tubular products, files and screw machine products. The company was organized by Joseph Murcott Jr., who has had a wide experience in file manufacture, and George A. Duden, who for more than 12 years was affiliated with Peter A. Frasse & Co., eastern distributors of Shelby seamless steel tubing, manufactured by the National Tube Co. Mr. Duden established the Philadelphia branch of the Frasse company and also managed its New York office.

Unfilled Orders

Of Steel Corporation Show Large Increase During September

Bookings of new business by the Steel Corporation in September were much heavier than generally had been supposed, and the increase of 409,163 tons in the statement of unfilled orders Sept. 30, issued Oct. 9, caused general surprise. The common belief has been that the gain would not exceed 100,000 to 200,000 tons. The increase placed the order book on Sept. 30 at 5,317,618 tons, the largest since the close of July, 1913.

Active rail bookings in part were responsible for the good showing for September. The Steel Corporation's orders of this class totaled 200,000 to 250,000 tons. In addition, considerable tonnage in the heavier lines was taken for shipment after Jan. 1, since buyers have been bringing increasing pressure upon makers to cover them for forward periods.

The unfilled tonnage by months with the changes are as follows:

Date.	Total.	Change, tonnage.	Change, per cent.
Sept. 30, 1915....	5,317,618	409,163+	8.13+
Aug. 31, 1915....	4,908,455	20,085—	0.04—
July 31, 1915....	4,928,640	250,344+	5.35+
June 30, 1915....	4,678,196	413,598+	9.69+
May 31, 1915....	4,264,598	102,354+	2.46+
Apr. 30, 1915....	4,162,244	93,505—	2.21—
Mar. 31, 1915....	4,255,749	89,622—	2.06—
Feb. 28, 1915....	4,345,371	96,800+	2.28+
Jan. 31, 1915....	4,248,571	411,928+	10.74+
Dec. 31, 1914....	3,836,643	512,051+	15.40+
Nov. 30, 1914....	3,324,592	136,505—	3.94—
Oct. 31, 1914....	3,461,097	326,570—	8.62—
Sep. 30, 1914....	3,787,667	425,664—	10.01—
Aug. 31, 1914....	4,213,331	54,742+	1.32+
July 31, 1914....	4,158,589	125,732	3.12+
June 30, 1914....	4,032,857	34,697+	0.86+
May 31, 1914....	3,998,160	278,908—	6.98—
Apr. 30, 1914....	4,277,068	376,757—	8.09—
Mar. 31, 1914....	4,653,825	372,615—	7.42—
Feb. 28, 1914....	5,026,440	412,760+	8.95+
Jan. 31, 1914....	4,613,680	331,572+	7.74+
Dec. 31, 1913....	4,282,108	114,239—	2.59—
Nov. 30, 1913....	4,396,347	117,420—	2.60—
Oct. 31, 1913....	4,513,767	490,018—	9.79—
Sep. 30, 1913....	5,003,785	219,683—	4.24—
Aug. 31, 1913....	5,223,468	175,888—	3.03—
July 31, 1913....	5,399,356	407,965—	7.03—
June 30, 1913....	5,807,317	517,005—	8.18—
May 31, 1913....	6,324,322	654,440—	9.38—
Apr. 30, 1913....	6,978,762	490,194—	6.55—
Mar. 31, 1913....	7,468,956	187,758—	2.45—
Feb. 28, 1913....	7,656,714	170,654—	2.18—
Jan. 31, 1913....	7,827,368	104,796—	1.32—
Dec. 31, 1912....	7,932,164	79,281+	1.01+
Nov. 30, 1912....	7,852,883	258,502+	3.40+
Oct. 31, 1912....	7,594,381	1,042,874+	15.33+
Sep. 30, 1912....	6,551,507	388,132+	6.29+
Aug. 31, 1912....	6,163,375	206,296+	3.46+
July 31, 1912....	5,957,079	149,773+	2.58+
June 30, 1912....	5,807,346	56,363+	0.98+
May 31, 1912....	5,750,983	86,983+	1.52+
Apr. 30, 1912....	5,664,885	360,044+	6.97+
Mar. 31, 1912....	5,304,841	149,359—	2.79—
Feb. 29, 1912....	5,454,200	74,479+	1.38+
Jan. 31, 1912....	5,379,721	294,960+	5.71+
Dec. 31, 1911....	5,084,761	942,806+	23.24+
Nov. 30, 1911....	4,141,955	447,627+	12.06+
Oct. 31, 1911....	3,694,328	83,011+	2.25+
Sep. 30, 1911....	3,611,317	84,668—	2.34—
Aug. 31, 1911....	3,695,985	111,900+	3.33+
July 31, 1911....	3,584,085	223,027+	7.16+
June 30, 1911....	3,361,058	247,871+	7.96+
May 31, 1911....	3,113,187	105,617—	3.28—
Apr. 30, 1911....	3,218,704	228,597—	6.63—
Mar. 31, 1911....	3,447,301	46,758+	1.37+
Feb. 28, 1911....	3,400,543	289,624+	9.31+
Jan. 31, 1911....	3,110,919	436,163+	16.30+
Dec. 31, 1910....	2,674,757	85,656—	3.09—
Nov. 30, 1910....	2,760,413	111,536—	3.88—
Oct. 31, 1910....	2,871,949	286,157—	9.12—
Sep. 30, 1910....	3,159,106	379,088—	10.74—
Aug. 31, 1910....	3,537,128	433,803—	10.92—
July 31, 1910....	3,910,931	286,863—	6.72—

The new plant of the Knox Pressed & Welded Steel Co., Pittsburgh, at Wheatland, Pa., is nearing completion.

Business News of Nation's Capital

Commission's Power to Prevent Dumping May Be Determined—Strong Opposition to 55-Cent Freight Rate From Pittsburgh to the Coast

Washington, Oct. 12.—Developments indicate that the federal trade commission, through its jurisdiction to prevent unfair competition, may attempt to stop the dumping of foreign goods into this country at prices below their market value. It is reported that, with the tacit approval of the commission, a test case will be made on the commission's power by a manufacturing concern in Seattle, Wash. This interest is said to be preparing to file a complaint with the commission charging unfair competition against an agency there which is alleged to have sold German-made goods at prices below the prevailing market value. During the war, of course, dumping from that country is out of the question owing to the English blockade. Even though the commission could not assume jurisdiction over such a case, it is contended that its powers in that direction could be tested, and, if necessary, an amendment might be added to the Clayton law making dumping unfair competition, and punishable as such, which would effectively meet the threatened flood of foreign products that is expected to confront American industries after the war. The Clayton act providing against price discriminations and unfair trade practices has been held by some as being a probable factor in preventing dumping. The question of proceeding against a foreign selling agency would, it is believed, involve treaty rights and perhaps international complications, although these matters would not prevent such a proceeding, it is contended, if authority for such action exists.

The administration, however, appears to favor enactment of an anti-dumping clause as the most direct and effective way of handling the situation, but, as has been pointed out, no definite stand has been taken on this question.

While the Canadian anti-dumping act has been studied, and was the basis for legislation in the Underwood-Simmons act when the latter passed the house, sentiment is growing stronger toward the Australian system of preventing dumping. Chairman Joseph E. Davies is known to have communicated with the attorney general of Australia with regard to the matter. That government deals with the subject entirely through its anti-trust laws, making "dumping" punishable as unfair competition and providing that in case where the unfair competition is established in the courts, the importation and sale of the article in question may be prohibited or restricted.

The administration might take up some sort of legislation dealing with anti-dumping in connection with its plan, announced last week through Secretary of the Treasury McAdoo, to retain the present duty on sugar "until conditions become normal". The latter recommendation, according to Mr. McAdoo, is to be made purely as a matter of revenue producing legislation and will be made along with other suggestions for that purpose, among them the extension of the war tax act.

With the sugar schedule in the tariff reopened, some think manufacturers and producers of all kinds will make a demand that the schedules in which they are interested should be opened.

Preparing to Fight

Washington, Oct. 12.—Plans being made by those favoring and opposing the establishment of the freight rate of 55 cents per 100 pounds on finished iron and steel products from the Pittsburgh district to the Pacific coast make it plain that the case will be fought vigorously before the interstate commerce commission. Both sides to the controversy are gathering material to support their respective positions. On the side urging establishment of the rate are steel shippers of the Pittsburgh district, who are being supported by railroads serving them and participating in the westbound transcontinental traffic. Arrayed against them are the American-Hawaiian, Grace and Luckenbach steamship interests, which, it is understood, are being supported by independent steel shippers along or near the Atlantic seaboard, as well as railroads which do not operate west of Pittsburgh. While some steel jobbers of Chicago are said to have protested to the commission through correspondence against the 55-cent rate being established, it is not believed steel companies generally of that district will protest. It has been pointed out that the latter have received the benefit of the opening of the Panama canal by the establishment of a 55-cent rate to the Pacific coast and will not see fit to object to Pittsburgh interests doing likewise, even though the latter get the same rate as the Chicago shippers.

The steamship people, represented by Attorney Frank Lyon, this city, have explained that they will enter an appearance before the commission—they have no right to file formal complain—to show the commission what it claims the water rates really are.

Shippers and supporting railroads have made the claim that the protesting steamship interests are getting as much business as they can handle, at least while the European war continues, and do not want to reduce rates while there is such an urgent effort to obtain cargo space for the transportation of munitions to Europe.

The commission is receiving a mass of correspondence from both sides and it has been increasing since the filing last week by R. E. Countiss, chairman of the transcontinental freight bureau, of a fourth section application asking authority to establish the 55-cent rate. He desires, by this application, to put that charge in effect regardless of the rates to intermediate points. No time has been set for hearings on the application.

Anti-Trust Policy

Washington, Oct. 12.—Arguments in the government dissolution suit against the American Can Co. took place last week in Baltimore. The government was represented by George C. Todd, assistant to the attorney general, and Special Assistant Attorney Henry E. Colton. Upon their return to Washington they took charge of the work of preparing a brief which is to be filed following the appeal of the department of justice in the dissolution suit against the United States Steel Corporation. They also have in charge the work of reducing the 51 volumes of evidence introduced at the hearing before the lower court. This task is a big one and is made necessary by the rules of the Supreme Court. It is expected the volumes will be reduced to three or four records. It will be several months before the condensation is completed and the brief filed. The formal appeal, however, must be filed by Nov. 10, or 60 days after entry of the decree of the lower court dismissing the suit against the United States Steel Corporation. No special importance, it is said, has been

attached here to the statement given out by Attorney General Thomas W. Gregory with regard to mergers of steel companies and consolidations said to be under way. The department of justice has not given these matters any official attention, having no reason to do so, and, moreover, apparently does not believe there is any "gigantic" consolidation of the big independent steel companies under way.

The attorney general's statement is as follows:

"It cannot be questioned that if it was lawful to unite through the United States Steel Corporation one-half of the competitive units in the steel trade, the other half would also have the right to combine. And, of course, what could be done in the steel trade could be done in every other branch of trade, thus virtually putting an end to competition.

"But the decision of the circuit judges of the third circuit in the steel case is not yet the established law. It is because of just such consequences that the government is appealing from that decision. Besides, in the harvester case a court of equal rank took a very different view of the law.

"The question is now pending before the Supreme Court. In the meantime, attempts to combine able and efficient competitors, affecting trade over a wide area, will be subjected to the closest scrutiny by the department of justice.

More Submarines

Washington, Oct. 12.—The navy department will open bids next month for two seagoing submarines. The submarines will be the largest ever built for this government, and will register 1,000 tons displacement submerged, and have a fuel capacity of 10,000 miles or more. The submarines will be a part of the naval fleet and accompany battleships on all cruises. Specifications will provide for steam turbines to develop a surface speed of 25 knots an hour. The vessels, according to the act of congress, are not to cost more than $1,500,000 each, exclusive of armor and armament.

Cramp Lowest

Washington, Oct. 12.—The lowest bids last week for torpedo destroyers were submitted to the navy department by William Cramp & Sons, Philadelphia, at a figure of $835,000 each for three 30-knot vessels, half of the number for which bids were opened. The Newport News Ship Building Co. was next to lowest, with a figure of $858,000 for two vesesls and the Bath Iron Works was third with a bid of $875,000 for one vessel.

What He Wants

Washington, Oct. 12.—Chairman Joseph E. Davies of the federal trade commission said last week, after a conference with President Wilson, that his estimates, which must be in by Oct. 15, will call for $495,000 for the next fiscal year. This is the sum asked for when the commission was created at the last congress, but it was cut down to $395,000.

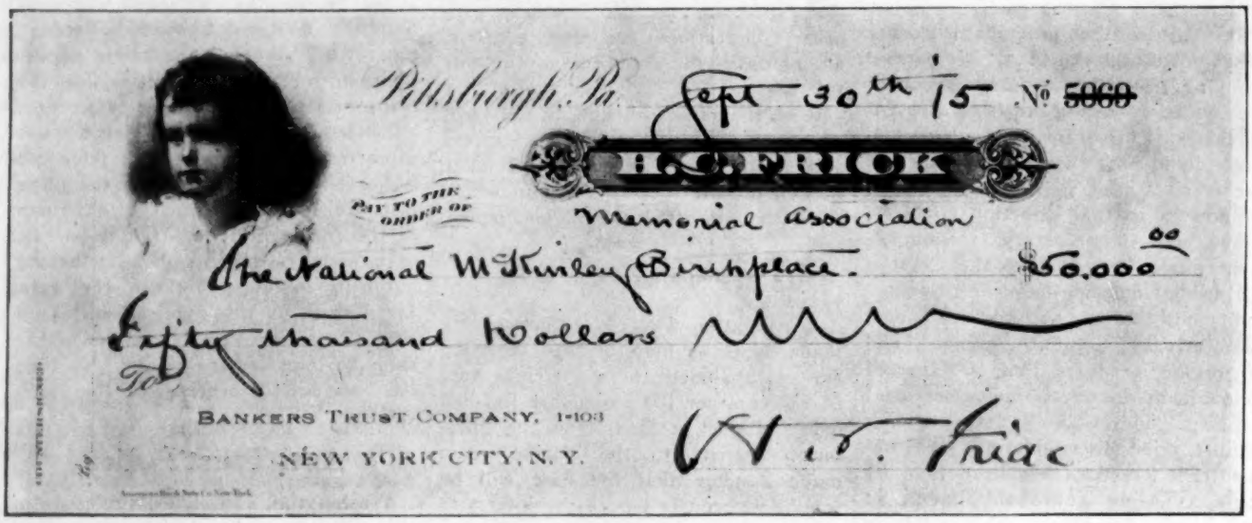
Mr. Davies said the amount he will ask for is necessary to conduct investigation into trade conditions abroad. President Wilson is said to be taking a deep interest in this commission and the work it has planned to accomplish..

Corner Stone

Of McKinley Memorial Will Be Laid Nov. 20

Joseph G. Butler Jr., president of the National McKinley Birthplace Memorial Association, Youngstown, has received a check for $50,000 from the largest contributor, Henry C. Frick, who was a personal friend of the martyr President. Although many have subscribed liberally, the association is in need of $50,000 additional to furnish the library and auditorium and take care of the landscape work in the park. It is also intended to raise an endowment fund of $100,000, the interest on which will take care of the memorial for all times. Many iron and steel companies and individuals whose prosperity is due largely to the protective policy so ably advocated by McKinley have not yet subscribed. As stated recently, the general contract for the memorial has been awarded to the John H. Parker Co., which recently obtained the contract for the magnificent building for the department of the interior, at Washington. The Parker company figured the contract at actual cost, declaring its desire thus to contribute to the patriotic memorial. Silver gray Georgia marble will be used in the construction.

The date of the laying of the corner stone has been changed to Nov. 20, with the expectation that ex-Secretary of State, Philander C. Knox will be present. Mr. Knox is now on the Pacific coast. On account of his close association with McKinley, personally and officially, and on account of his great ability as a speaker, he is expected to deliver an address of a very high order on this occasion.



CHECK OF HENRY C. FRICK FOR McKINLEY MEMORIAL

News of Employers and Employes

Worcester Strike Assumes Serious Proportions—Employes of Hendee Mfg. Co. Return to Work

UP TO this week nearly 2,000 machinists are out on strike in Worcester, Mass. It includes between 800 and 900 men at the Reed-Prentice Co., about 300 at the Whitcomb-Blaisdell Machine Tool Co., 275 at the Leland-Gifford Co., between 300 and 400 at the Norton Grinding Co., and about 100 who have been discharged by the Morgan Spring Co. and the Heald Machine Co. The men at the Norton Grinding Co. were locked out Saturday morning after their demands had been refused by the company and the men voted to defer further action until after a hearing by the state board of conciliation and arbitration. The public hearings begin this week. The 1,500 machinists employed by the Crompton & Knowles loom works have voted to strike, leaving the date to Organizer Joseph H. Gilmour, who has decided to withhold action until after the public hearing. Gilmour was arrested twice last week while addressing machinists in Worcester streets. He was fined in both instances and appealed for a jury trial in the superior court. The union claims 800 men have left Worcester in search of work elsewhere, but it is not believed the number will exceed 200.

The strike of 1,200 employes of the Hendee Mfg. Co., Springfield, Mass., which affected the entire plant, has been settled and the men have returned to work. The agreement on which the settlement is made is to be in effect two years. Hendee's is to remain an open shop but the union is recognized. The division of hours of the 48-hour week, the cause of the strike, is left to arbitration. The company and men agree that all future disputes that cannot be settled in conference shall be left to the arbitration of the state board of conciliation and arbitration.

The striking employes of the Hendey Machine Co., Torrington, Conn., have voted to remain on strike. The company refused to grant their new petition, which asked for a 50-hour week and a wage increase of 35 per cent. The works committee was informed that the company's offer of a 55-hour week with 12½ per cent increase in wages was still in force, and that those who wished might return to work under those conditions. The last vote was in answer to this summons.

The Harley Co., one of the largest foundries in Springfield, Mass., began work this week on a 48-hour schedule in its machine department. It is considered possible that a similar schedule of hours will be worked in the other departments also.

Ninety-four machinists employed by the Builders' Iron Foundry, Providence, R. I., went out on strike last week in sympathy with the strikers at the Brown & Sharpe Mfg. Co., in the same city. The plant employs 400 men. William A. Viall, secretary of the Brown & Sharpe Mfg. Co., who is president of the National Machine Tool Builders' Association, declares that he believes that the backbone of the strike at that plant had been broken. He states that 3,700 men have returned to work, the largest number since the strike began. No places are being held open for any of the men who have gone out.

Forty-eight molders employed in the new plant of the Putnam Machine Co., Fitchburg, Mass., a branch of Manning, Maxwell & Moore, New York, went on strike last week because of the alleged refusal of the company to recognize union demands. The plant is working day and night on war orders and employs more than 500 men.

Providence Engineering Works, Providence, R. I., began Monday with eight-hour shifts, taking the place of 12 per cent war bonuses which have been paid, but which did not seem to be satisfactory to the employes. The men will continue to work nine hours a day and will be paid overtime at the usual rate for the extra hour a day.

Situation Clearing

Trenton, N. J., Oct. 12.—A number of big plants in New Jersey have been greatly affected by strikes of late, but the situation is beginning to clear, the mechanics gaining nearly all their concessions at each works. The 1,100 strikers at the Standard Underground Cable plant, Perth Amboy, N. J., have returned to work after being granted time and a half pay for overtime and nine and a half-hour day basis. The employes of the Warren Foundry & Machine Co., Phillipsburg, N. J., have been granted demands for increased wages. Supt. Shellman Brown announces that the patternmakers will receive an increase from 15 to 25 cents a day, while the foundrymen will receive 10 cents a day more. The strike of the workmen at the Singer Sewing Machine Co.'s plant, Elizabeth, N. J., has ended by an increase in pay. The strikers at the Jordan L. Mott Iron plant, Trenton, N. J., are also receiving an increase in pay following a walkout.

Gisholt Advances

As a means of giving its employes a share of the financial returns from the unprecedented rush of business it is experiencing, the Gisholt Machine Co., Madison, Wis., on Oct. 1, announced a general increase in wages amounting to 10 per cent. The concern is working to the utmost limit of its capacity, the demand for lathes and other machine tools for domestic as well as foreign shipment having long ago swamped the plant. About 500 employes will share in the advanced wages. Not only is the Gisholt company erecting two new shops, but it is taking over the plant of the General Electric Co. at Madison, as soon as various departments are vacated and the equipment shipped to Fort Wayne, Ind., where the work formerly done at Madison will be concentrated. The increase in wages was entirely voluntary.

Will Protect Employes

International Silver Co., Meriden, Conn., has posted notices in its factories to the effect that the corporation will protect employes from being "coerced into joining any organization" and will also protect employes who wish to relinquish membership in such organization. The notice adds:

"As in the absence of a contract any employe has a right to leave the company without assigning a reason therefore, the company has also a similar right to discharge employes without assigning reasons therefore".

The union is said to have already enrolled about 3,000 of the workers in the Meriden factories.

New Open Shop Plan

An entirely new method of maintaining the open shop has been suggested by Charles H. Merritt, associate counsel of the American Anti-Boycott Association, in a letter to members of the association. He proposes the making

of contracts by employers with each other to operate only open shops. These contracts, he says, may prove effective defense against some of the dangers of the closed shop propaganda because they create new property rights entitled to legal protection as such against the interference of outsiders. If the union attempts to persuade the manufacturer to establish a closed shop in violation of such a contract, the other manufacturers who have subscribed thereto may, in an appropriate case, secure injunction. If, under such circumstances, the agreement is violated, damages may be assessed against both the manufacturer and the union. Mr. Merrit submits a form for a proposed contract of this kind.

Pension Fund Instituted

J. I. Case Threshing Machine Co., of Racine, Wis., has instituted an employes pension system. Provision is made for an allowance of employes who have been with the company for 20 years and who have reached the age of 65. The pension will consist of 1 per cent of the highest annual salary paid within the 10 years preceeding retirement, multiplied by the number of years of service. The maximum will be $50 per month and the minimum $18.

The Birdsboro Foundry & Machine Co., Birdsboro, Pa., has advanced the wages of its employes 4 per cent effective Oct. 1, which is in addition to a recent raise of 6 per cent. The Alan Wood Iron & Steel Co. at Conshohocken, Pa., has raised its tonnage men 10 per cent.

The James L. Stuart Co., Cleveland, has been awarded the contract for the construction of the first installment of 24 houses for the Remington Arms & Ammunition Co., on Boston and East avenues, Bridgeport, Conn. The houses will be of brick, each 28 x 40 feet, of the semi-detached type, and arranged for two families each. The roofs will be covered with burnt clay tile and the interior will be trimmed with cypress. All modern improvements will be provided. A. C. Bossom, New York, is the architect.

The Gardner Agency, 45 Leadenhall street, London, Eng., desires direct communication with American manufacturers of twist drills and other high class tools. This agency states that it has many inquiries for these tools.

The Carnegie Steel Co. has ordered five large steel cars from the Youngstown Car Mfg. Co., Youngstown, O.

Benzol Prices

Are So High as to Cause Hardship to Consumers

I. F. Stone, president of the National Aniline & Chemical Co., addressing a New York section of the American Chemical Society, on Oct. 8, declared that the steel works of the United States now are producing about 15,000,000 gallons of benzol annually, which compared with about 3,000,000 gallons before the war. He said the demand for this product for war purposes was so great that even the increased supply was not adequate, with the result that prices were so high that manufacturers using benzol for ordinary products, apart from the war needs, were facing hardships. He predicted that the production of benzol in this country would continue to increase and that the German domination of this product in the past would disappear permanently. He stated that the use of benzol on a large scale for motive power for automobiles in place of gasoline, was assured, as the increased production would bring the price in line with that of the latter fuel. Inasmuch as the oil companies have found difficulty in meeting the expansive demand for gasoline for automobile purposes, this development, he considered, would be a great relief.

Other speakers at the meeting emphasized the imperative need of tariff protection against foreign competition in those new lines of chemical manufacture which are being increased largely in this country since the war.

Ryerson Tool Steel Name Contest

Joseph T. Ryerson & Son opened a contest for the iron and steel trade about the first of the year, offering $100 for a name for their line of tool steel. Those sending in the next best 100 names were each to receive a Ryerson ready reference book, a text well known for its valuable data and information. The next 200 contestants receive bound copies of the same book.

The trade has shown much interest in the contest and has helped the Ryerson company in a material way to secure a good trade name. There were over 10,000 names entered.

The judges, after a long-drawn-out deadlock, decided upon the word Ryolite as the winning name. First, because it will remind the buyer of Joseph T. Ryerson & Son; second, because there is an interesting story associated with the name.

Ryolite, spelled "rhyolite", is used to denote a class of hard, igneous rocks of volcanic origin. Rhyolite was the strongest material known to the ancient Aztects and was used for tools and weapons of various kinds. The most famous Aztec weapon, known as the maquahuitl, was made from rhyolite.

Ryolite, the winning name, was entered by Robert H. M. McNeilly, Nashville, Tenn., and P. R. Kohlsdorf, Milwaukee, Wis. The honors and first prize were therefore divided equally according to the law in public contests of this kind.

A complete story of the contest and Ryolite is given in the October issue of the Ryerson Monthly Journal and Stock List.

Plan Service Bureau

Cleveland, Oct. 12.—The board of directors of the chamber of commerce of the United States, recently in session here, is perfecting details of an organization service bureau which will disseminate information on structural standards and effective methods for commercial bodies. Colvin B. Brown, present chief of the bureau of domestic exploitation at the Panama-Pacific International Exposition and former federal trade representative in foreign countries, is to head the new bureau.

The Cabot Fund

The late Charles M. Cabot, who attained considerable prominence on account of his agitation in favor of shorter hours and other improvements in labor conditions, provided in his will for the creation of a Cabot fund of $50,000, to be held in trust by three managers for charitable purposes. Mr. Cabot, who died on Sept. 5, says in his will that without intending to limit the discretion of the managers he suggests that said fund be used to procure or promote the investigation and study of industrial conditions in this country and in the publication of the results of such investigation and study to the end that industrial abuses and hardships of industrial laborers may be known and remedied. The first members of the board of managers, he provides, shall be Paul U. Kellogg, editor of *The Survey*, New York; Edward T. Devine, New Rochelle, N. Y., and Philip Cabot.

The plants of the Reliance Architectural Iron Works and of Frederick Foster, iron founder on North Henry street, New York City, were damaged by fire on Oct. 7, entailing a considerable loss. The damage to the foundry plant is estimated at $10,000.

Iron and Money: Fact and Comment

Railroad Shares Develop Strength, But Do Not Soar With War Stocks—Westinghouse Report

ADVANCES in war shares formed an important feature of the market last week. The government estimate of a wheat crop exceeding a billion bushels and a corn crop of three billion bushels had a stimulating effect on the market. The increase in loans to the extent of $44,000,000 in New York clearing house banks was accepted as proof of a broader demand for banking capital.

The market was a wild one Monday, showing that many speculators had lost their heads. While there were many advances, evidences of a desire to liquidate were also present and war stocks alternated between strength and weakness. London was somewhat purturbed on account of wild speculation in the United States.

Numerous declines were recorded Tuesday. The announcement was made that stock exchange dealers had decided to tax odd lot purchasers ¼ of 1 per cent instead of the customary ⅛, the policy being adopted to bring about a reduction of this kind of business and to relieve clerical forces of New York houses which have been very much overworked recently. Various reports in regard to consolidations continued to be heard.

War stocks were not regarded with much favor Wednesday, but rail securities developed considerable strength. Bethlehem Steel, however, advanced to a new high record, 401, and closed only a point lower. Steel common was weak.

Thursday witnessed another runaway stock market. Bethlehem Steel, which only last year sold at 26½, rose nearly 50 points, making a new record of 450. Crucible Steel, Baldwin Locomotive, Westinghouse and other industrials made gains of from 5 to 10 points. In spite of the checks and hindrances imposed by the banks and trust companies and financial institutions, the day's sales were slightly in excess of a million and a half shares. Bond sales amounted to $5,540,000, par value.

There was considerable activity in bonds Friday. Rail shares were also prominent. The most active stock in the list, Reading, advanced 7⅝ points, but other railroad stocks made substantial gains. Great Northern Ore advanced on the strength of a report, which afterward proved to be without foundation, that the Midvale Steel Co. had an option on 3,000,000 tons of ore on Hill lands.

Railroads were still active Saturday, but it does not seem probable that speculation in these shares will become as wild and unreasonable as that in the so-called war stocks. The reason is that people are more accustomed to dealing in rails and know more about the earnings of railroad companies.

Quotations at the close of business Oct. 9 and changes in the leading stocks identified with the iron and steel industry for the week are shown in the following table:

	Close Oct. 9.	Net change.
American Can	62¼	—2¼
American Can, prfd.	105¾	—2¼
Amer. Car & Fdy. Co.	81⅞	—13⅜
Amer. Car & Fdy. Co., prfd.	115	—1
American Locomotive	65¾	—5½
American Locomotive, prfd.	99½	...
American Steel Foundries	65½	+1½
Baldw'n Locomotive	115	—11¼
Baldwin Locomotive, prfd.	109½	—3⅜
Bethlehem Steel	445	+70
Bethlehem Steel, prfd.	161	+1
Colorado Fuel & Iron	58	—4¾
Continental Can	107	—9⅞
Continental Can, prfd.	107½	—1½
Crucible Steel	91½	—13½
Crucible Steel, pfrd.	106⅞	—3¼
General Electric	176½	—1½
International Harv. of N. J.	108¼	+1¾
Inter. Harv. of N. J., prfd.	117	...
International Harv. Corp.	71	+1
Lackawanna Steel	81½	—6⅝
Nat'l. Enamel'g. & Stamp. Co.	29⅜	—2½
Nat'l. Enam. & Stp. Co., prf.	91½	— ½
Pressed Steel Car	70½	—4¼
Pressed Steel Car, prfd.	104	+3
Pullman Palace Car	166	+6
Republic Iron & Steel	52½	—2⅛
Republic Iron & Steel, prfd.	103½	...
U. S. Cast Iron Pipe & Fdy.	25	—3½
U. S. C. I. Pipe & Fdy., prfd.	48	—1
United States Steel	81⅝	+ ⅛
United States Steel, prfd.	114¼	— ⅛
Westinghouse Mfg.	133½	—1½

The following table shows changes in maximum quotations of stock not listed on the New York stock exchange.

	High for Oct. 8.	High for Oct. 1.
American Radiator	357	...
American Ship Building	37½	37½
Cambria Steel	69⅞	75
Chicago Pneumatic Tool	88	88½
Inland Steel	..	274
LaBelle Iron Works	46	46½
Lake Superior Corpn.	9¼	10¼
Pennsylvania Steel, prfd.	98	88½
Stewart-Warner Speed. Co.	76½	78⅝
Warwick Iron & Steel Co.	11	10¾
Westinghouse Air Brake	143½	143½
Westinghouse El. & Mfg. Co.	70⅝	65¾

Stock Jumps

Stock of the Colt's Patent Fire Arms Mfg. Co., Hartford, Conn., has jumped 100 points within a week, as the result of the reception of an order by the company approximating $16,000,000 from Greece and Servia. The new order, on which $5,000,000 was paid in cash, is for machine guns and automatic Colt revolvers. There are probabilities of the order being increased to $25,000,000. Stock has gone as high as 855, compared with less than 200 a year ago.

Earnings on Munitions

The report of the Westinghouse Air Brake Co. and subsidiary companies has been issued for the year ended July 31 last. It shows net profits for the year of $1,575,838, against $3,482,994 the previous year, and a profit and loss surplus of $4,390,342, against $5,648,865 in 1914.

President H. H. Westinghouse says in the report that during the month of April, 1915, the company accepted orders for 18-pound shrapnel, complete, except propellant power, and additional cartridge cases amounting in total to $17,930,000. In this connection he adds:

"While the terms are favorable, with ample guarantees against contingencies, these orders have necessitated a heavy expenditure for special machinery and for its installation in temporary, though substantial buildings, to the end that the maximum output of the company's regular product might not be affected in case of a sudden revival of the railway supply business. It is expected that when the value of this special machinery and the buildings not available for future use shall have been charged off, the net result will represent a substantial but not an unusual manufacturing profit on the amount involved.

"The factor that chiefly influenced the management in deciding to undertake this special line of work was the unfavorable outlook for the railway supply business in general and the desire to prevent, if possible, a repetition of the hardships endured by your working force last winter through lack of employment."

The Aberthaw Construction Co., Boston, specialist in reinforced concrete and in industrial buildings, as well as dams and water powers, is about to move the main offices from No. 8 Beacon street to the new Niles building at No. 27 School street.

Bliss & Laughlin, Harvey, Ill., makers of shafting and cold rolled steel, have been refusing orders from war sources but have booked sufficient orders to bring their working force to the highest point it has been since organization.

Railroads Jump Into the Market

Demand for Small Tools Increasing While Crane Market Slackens—
Extensive Plant Additions Made in Numerous Districts

HEAVY buying of projectile-making equipment continues to feature the machine tool market. The volume of business is governed entirely by the supply available, since inquiries involving hundreds of tools are flooding the market. While domestic inquiry is heavy, the bulk of the actual business is coming from abroad. Of the foreign countries, Italy probably is the most active purchaser, but large orders also are coming from Russia, France and England. The tools most called for are engine lathes of the larger sizes, ranging from 24 to 30 inches, turret lathes and screw machines. A brisk demand continues, however, for the smaller-size lathes, and these can be disposed of as fast as they are offered. In big volume also is the demand for milling machines, heavy duty drills and shapers, while the call for radial drills and planers is increasingly urgent. No further developments have occurred in reference to the 6-inch to 12-inch shell contracts which the French government is expected to let in this country. A great many concerns have been making inquiries in regard to equipment for making shells of this size and among the companies which are figuring most actively in this direction are the American Brake Shoe & Foundry Co. and the American Locomotive Co.

A marked improvement is noted in the machine tool demand from eastern railroads. Several of the roads are showing more of a disposition to talk in regard to their requirements and while a good many inquiries have come out, none of them can be regarded as important. Among the roads which have placed fair-sized orders for machine shop equipment are the New York Central and the Lehigh & New England. The latter road, however, did not close on all of the list it recently issued.

Not so much activity is reported in the crane market. The recent large volume of buying, however, evidently served to put cranemakers in a more independent position, since the prices which now are being quoted are approximately 10 to 15 per cent higher than those prevailing a few weeks ago.

Plant Extensions

Among concerns in the east who are extending their plants or adding to their capacity are the Bristol Brass Co., Bristol, Conn.; Mead-Morrison Mfg. Co., Boston; Poole Engineering & Machine Co., Woodberry, Md., the last named building another plant at Texas, Md.; Hammond Steel Co., Solvay, N. Y.; Hess-Bright Mfg. Co., Philadelphia; Lenox Motor Co., Hyde Park, Mass., which will build a new plant in Lawrence, Mass.; Norton Co., Worcester, Mass.; Chase Metal Works, Waterbury, Conn.; White-Warner Co., Taunton, Mass.; E. R. Merrill Spring Co., New York, and others. The Exeter Machine Works, Pittston, Pa., has started work on the building of 204 16-inch swing lathes, which will be delivered to a concern in the Pittsburgh district for the manufacture of shrapnel.

Chicago Market Quiet

Machine tool dealers in the Chicago district are doing comparatively little business, owing to their inability to furnish machines. Deliveries from builders are unusually delayed and in many cases orders placed months ago have not been filled. Dealers who have had contracts unduly delayed, have visited the eastern manufacturers, hoping to expedite shipments, but have met with little success. Increased inquiry from domestic sources has been evident, but only occasional orders have been taken as contracts usually call for lathes which are unobtainable.

English and French inquiries are slack, though some Canadian contracts have been placed and a few machines shipped to the Dominion. Some demand from Italian and Russian buyers has appeared, but as in other cases few orders have been accepted, owing to the scarcity of lathes. Excepting occasional inquiries for single tools, the railroads have done little buying this week, prices and deferred delivery being a strong deterrent.

Sales of second-hand tools are fair. However, the assortment offered includes many machines which are not salable and prices do not permit resales at a profit, resulting in little life in the used tool market.

Tool Market Active

Machine tool dealers in the Pittsburgh district have found the market much more active than during the preceding week. Heavy inquiries from domestic and foreign sources for shrapnel-making equipment have been noted. The Allegheny Steel Co., Brackenridge, Pa., is installing considerable special equipment for making brass shells. The Pittsburgh foreign trades commission has received inquiries for a number of screw, rivet and wire forming machines for shipment to Scotland.

Numerous extensions to finishing mills, foundries and machine shops are under way. The Youngstown Sheet & Tube Co. will add three open hearth furnaces to its present battery of six. The Youngstown Steel Car Co. plans to enlarge its works for the manufacture of narrow-gage industrial cars. The Klimke Machine Co., McKees Rocks, Pa., has been incorporated to manufacture machinery. The Unique Brass Foundry Co., Buffalo, N. Y., will build a modern foundry and a machine shop and the Atlas Steel Casting Co., also of Buffalo, will increase the capacity of its foundry.

Threatened labor trouble at the plant of the Westinghouse Electric & Mfg. Co., East Pittsburgh, has subsided. Working hours have been reduced and a slight advance in wages allowed. The company is making large quantities of war material.

Strike Affects Plants

A strike of union machinists has been the most important item of interest in Cincinnati in the past week. Machinists began leaving their work when their demands were refused. They are asking for an eight-hour day, and the same pay for a week of 48 hours that they formerly received for 52½ hours. The following plants have been affected by the walkout: The American Tool Works Co., the J. H. Day Co., the Boye & Emmes Machine Tool Co., the Acme

Loading Pig Iron into Charging Boxes

Where Quality Begins

In the plant of The Central Steel Company, *quality* begins right in the open hearth stock yard with the selection of high grade pig iron purchased under rigid specifications covering chemical and physical requirements.

And the same extreme care is taken in *every* step in the manufacture of our products.

AGATHON STEELS

The word "AGATHON" which signifies "highest quality" was an inspiration to the Ancient Greeks. The old Greek sculptors, famous for their "Agathon" art, used great care in the selection of their rough stone.

We are no less careful in our choice of *raw materials*.

"AGATHON" Chrome Nickel
"AGATHON" Chrome Steel
"AGATHON" Chrome Vanadium
"AGATHON" Nickel Steel
"AGATHON" Special Analyses
"AGATHON" Vanadium
"AGATHON" Silico-Manganese
"AGATHON" High Carbon

THE CENTRAL STEEL COMPANY

MASSILLON, OHIO

Detroit Office: 326-27-28 Ford Bldg., F. Walter Guibert, District Representative
Cleveland Office: Hickox Bldg. - The Hamill-Hickox Co., District Representative

Say you saw it in THE IRON TRADE REVIEW

Tool Co., the Lynn-Superior Co., the Bradford Machine Tool Co., the Cincinnati Pulley Mfg. Co., the Cincinnati Shaper Co., and the Oesterlein Machine Tool Co. More walkouts are expected shortly. In no cases have these plants been forced to close down, as a sufficient number of men have remained at their work to maintain operations.

W. E. Raymond, of Ft. Williams, Canada, has just completed a purchase of 15 carloads of machinery in Cincinnati, which will be shipped to Canada for the manufacture of shrapnel. Orders taken by machine tool builders in September were far below those of June or July, and slightly below those of August. The outlook for new business for October is not promising, but since contracts on file are ample, no immediate orders are being sought.

EASTERN STATES

BOSTON.—Henry K. Porter, will erect a 1-story, 75 x 88-foot addition to his bolt machinery plant at Everett, Mass. Samuel D. Kelley, 209 Washington street, the architect, has awarded the building contract.

GLOUCESTER, MASS.—The Mead-Morrison Mfg. Co., East Boston, plans the erection of a plant for the manufacture of steel forgings. The plant of the Cape Ann Anchor & Forge Co. has been leased and an addition will be erected. The plant will be equipped with forging machines of a heavy type, as well as 200-horsepower boilers.

LAWRENCE, MASS.—The Lenox Motor Co., Hyde Park, will build a 1-story and basement, 60 x 600-foot automobile factory in Laurence.

WATERBURY, CT. — The Chase Metal Works will add a number of new buildings to its plant. These will include one 1-story, 140 x 180-foot; one 2-story, 60 x 260-foot; one 2-story, 60 x 320-foot; one 2-story, 20 x 60-foot; one 2-story, 60 x 160-foot; one 2-story, 60 x 200-foot; one 2-story, 60 x 80-foot; one 2-story, 60 x 120-foot and one 1-story, 100 x 200-foot structures.

BUFFALO, N. Y.—The Atlas Steel Casting Co. awarded a contract for the steel work for an addition to foundry to the Progressive Structural Steel Co.

BUFFALO, N. Y. — The Unique Brass Foundry Co. will build a 50 x 100-foot foundry and a 36 x 85-foot machine shop at Grant street and New York Central railroad; Edwin C. Hass, 558 E. North street, will receive bids.

BUFFALO, N. Y.—The American Radiator Co., 1807 Elmwood avenue, has had plans prepared and will start work shortly on a 2-story brick addition to be used as a reseach laboratory.

NEWBURGH, N. Y.—The Newburgh Ship Building & Mfg. Co. has been incorporated; $150,000 capital stock; by Benjamin B. Odell Jr., Frank N. Bain, A. Lincoln and J. Miller, Newburgh.

NEW YORK.—The P. & L. Contracting Co., 230 Grand street, will take subbids on a 4-story, 94 x 140-foot building to be erected in Brooklyn, which will be rented for manufacturing purposes.

SALAMANCA, N. Y.—The plant of the Chesbro Milling Co. was seriously damaged by fire. The main building was a 4-story structure.

BRACKENRIDGE, PA. — The Allegheny Steel Co. is installing special equipment for the manufacture of brass shells.

EAST PITTSBURGH, PA. — James A. Wetmore, acting supervising architect, Washington, D. C., asks bids until Nov. 6 for United States post office.

McKEES ROCKS, PA.—The Klimke Machine Co., capital stock $10,000, incorporated by Harry Leck, Frank Heigel and Anton E. Klimke, to manufacture machinery.

PHILADELPHIA.—The Southwark Foundry & Machine Co. has increased its capital stock from $500,000 to $1,300,000.

PITTSBURGH.—The Liquid Fuel Combustion Co. will erect two factories, 84 x 136 and 96 x 136 feet, respectively.

PITTSBURGH.—The Brady Scrap Co., capital stock $20,000, incorporated by Harry Hood, Thomas P. Kennelley, Pittsburgh, and Gustav Schmall, Philadelphia, to manufacture commercial metal from scrap.

PITTSBURGH. — The National Enameling & Mfg. Co., capital stock $10,000, incorporated by W. S. Armstrong, New Kensington, R. B. White, Pittsburgh, and B. F. Bachman, Swissvale Pa., to manufacture metal products.

PITTSBURGH. — The Pittsburgh foreign trade commission, Farmers Bank building, has received inquiries from Schoenfeld & Co., Glasgow, Scotland, for a number of rivet, screw and wire forming machines.

PUNXSUTAWNEY, PA.—City plans to install municipal water works, E. W. Hess, Clearfield, Pa., is preparing plans.

ATHENIA, N. J.—John R. Cooke & Son Co. has been incorporated to do iron and steel fabricating; $50,000 capital stock; by John R. Cooke, Alonzo Winters and Watts T. Cooke.

HIGH BRIDGE, N. J.—The Taylor Iron & Steel Co. plans to enlarge its plant by several additions.

CENTRAL STATES

CINCINNATI.—The Greenville Gravel Co., Greenville, O., will erect a concrete and steel gravel washing plant in Cincinnati.

CINCINNATI.—Work has been started on a 60-ton ice plant to be located in Corryville, a suburb. All equipment has been purchased. The building will be 100 x 100 feet, brick and concrete construction. Joseph Reichert is president of the company which has not been named.

CINCINNATI. — Woodworking equipment will be needed by the Huss Furniture Mfg. Co., Hamilton, O., which has taken over the plant of the Huss Bros. Mfg. Co., Cincinnati. Headquarters and plant of the company will be in Hamilton. The new company was recently incorporated with a capital stock of $100,000.

CLEVELAND. — C. Greve, 1840 East Ninety-third street, has let a contract for a 2-story and basement, 70 x 144-foot machine shop.

CLEVELAND.—The Peerless Motor Car Co. probably will build next spring a 5-story 55 x 325-foot motor truck factory. Ernst McGeorge, 853 Leader-News building, is the engineer.

NILES, O.—County commissioners plan to build a new bridge on Federal street.

PAINESVILLE, O.—Plans and specifications have been submitted to the county commissioners for a high-level bridge over the Chagrin river and flats. Wilbur J. Watson Co., Leader building, Cleveland, is the associate engineer. The estimated cost of construction is $225,000. Plans call for a 1,380-foot structure with a 30-foot roadway with two 6-foot side tracks. The center span will be 200 feet long together with seven 90-foot spans supported by several smaller ones. A bond issue will be voted in November.

STEUBENVILLE, O.—James C. Cayne has awarded a contract for erecting a 3-story, 48 x 165-foot addition to Wells high school.

YOUNGSTOWN, O.—Youngstown Sheet & Tube Co. has completed plans for the addition of three open hearth steel furnaces to its present battery of six. Cost of improvements will approximate $500,000.

YOUNGSTOWN, O.—City engineers and representatives of railroads have agreed upon plans for a steel viaduct over the Lake Shore and Erie railroad tracks in East Federal street, to replace the present elephant bridge. Structure will cost about $60,000.

YOUNGSTOWN, O.—Youngstown Steel Car Co., capital stock $100,000 has been incorporated by William Wilkoff, Louis Wilkoff, Charles Hughes, John T. Harrington and J. W. Blackburn, Youngstown. John T. Harrington, attorney for the company, states that the old works in Wilson avenue will be enlarged and new buildings erected for the manufacture of narrow gage cars for industrial works.

CLARKSBURG, W. VA.—Water works and sewerage board ask bids until Oct. 21 for two gas engines and two punches for pumping station. Scotland G. Highland is secretary of the board.

FAYETTEVILLE, W. VA.—H. G. Scott, general manager of Virginian Power Co., Charleston, W. Va., is interested in a proposed electric railway to extend from Fayette Station to Berkley, a distance of 35 miles.

HUNTINGTON, W. VA.—The Pond Fork Railroad Co., capital stock $26,000, incorporated by R. M. Baker and F. B. Enslow, to construct railroad from Madison to Pond Fork, a distance of 25 miles.

INDIANAPOLIS, IND.—The Welman Valve Co. has been incorporated to manufacture gas shut off valves; $50,000 capital stock; by C. W. Welman, J. E. Bingham and R. R. Ross.

MARTINSVILLE, IND.—The Martinsville Ignition Co. has been incorporated to manufacture electrical appliances; $10,000 capital stock; by F. L. Wiltshire, C. S. Cunningham and Carl J. Nutter.

STROBE, IND.—The Julius Strobe Portland Cement Co. has had plans prepared by the Hunt Engineering Co., Kansas City, Mo., for rebuilding its plant at a cost of $500,000.

CHICAGO.—B. & O. Chicago Terminal Railway Co. will build a coaling station at 1450 South Lincoln street to cost $25,000.

CHICAGO.—The Chicago, Milwaukee & St. Paul Railway has decided to electrify all lines in the west where sufficient power is available.

CHICAGO.—Marshall & Fox, architects, 38 South Dearborn street, are preparing plans for a theatre building for Jones, Linick & Schaefer Co., 110 South State street, to be erected at South State and Van Buren streets at a cost of $250,000.

OTTAWA, ILL.—The board of supervisors of LaSalle county will build a bridge over

the Illinois river at Shippensport estimated to cost $140,000.

ALMA, MICH. — The Alma Standard Foundry Co. will move to Saginaw and build a new foundry.

BATTLE CREEK, MICH.—The Nichols & Shepard Co., founder, is building an addition to the shipping room and the foundry is being remodeled. Additional foundry equipment will be installed.

DETROIT.—The National Twist Drill Co. is building an addition to its plant at Brush street and Milwaukee avenue.

DETROIT.—The Gemmer Mfg. Co., manufacturer of automobile parts, has plans prepared for a 2-story manufacturing plant, 40 x 60 feet.

LANSING, MICH.—The Atlas Drop Forge Co. is to spend $50,000 on improvements which have not yet been announced.

MANISTEE, MICH.—Manistee Iron Works will build a cupola room 30 x 32 feet and a core oven room 20 x 30 feet. Electrically driven machinery, crane and a blower will be installed.

OWOSSO, MICH.—The American Malleable Co. announces that the capacity of its plant will be doubled by the installation of two additional furnaces.

PONTIAC, MICH.—The American Forging & Socket Co. will build a plant at Pontiac.

PONTIAC, MICH.—Oliver H. Law, Detroit, is promoting an electric railway from Pontiac to Owosso.

MILWAUKEE.—The Milwaukee Forge & Machinery Co. is having plans prepared for an addition to its factory to be erected next spring.

MILWAUKEE.—The Modern Grinder Co. has been incorporated to manufacture tool grinders and similar devices; $10,000 capital stock; by Anthony Cohn and Ely Bochshe.

ST. CHARLES, MO.—The St. Marys Oil Engine Co. has been incorporated to manufacture oil engines; $300,000 capital stock; by J. D. Anderson, Louis Marten and J. H. Steinbrinker.

CLERMONT, IA.—C. Miller & Sons will spend about $20,000 in improving their electric light plant.

PERRY, IA.—City of Perry is in the market for a high duty pump. Adrian Cross is city clerk.

MANKATO, MINN.—The City council has engaged Donald E. Price, Lincoln, Neb., as construction engineer for a reinforced concrete bridge 500 feet long, 38 or 48 feet wide, costing from $80,000 to $100,000.

SOUTHERN STATES

BIRMINGHAM, ALA.—The plant of the Starr Furnace & Foundry Co., 501 Eighth street, south, was damaged by fire.

BIRMINGHAM, ALA.—The Witherill Machine Co. has been incorporated; $20,000 capital stock; by Charles C. Steward, Roy A. Witherill and Ella S. Witherill.

BIRMINGHAM, ALA. — The Birmingham Mfg. Co. has been incorporated; $25,000 capital stock; by Lewis Whaley, W. C. Appleby and William Y. Prince.

SHREVEPORT, LA.—The plant of the Henderson Iron Works was damaged by fire.

CELESTE, TEX.—T. J. Vines & Sons will rebuild the electric light plant recently damaged by fire.

BEEBE, ARK.—Plans for a water works system costing $15,000 are being prepared by Lund & Hill, engineers, Southern Trust building, Little Rock, Ark.

LITTLE ROCK, ARK.—The Ozark Railway Co. has been incorporated with $900,000 capital stock, to build a line from Greene County, Mo., to Rothville, Ark. R. V. Loba, Springfield, Mo., is president.

NEWPORT, ARK.—The St. Louis & Iron Mountain Railway is to spend $500,000 on its White River division, including replacement of wooden bridges by steel structures.

MEMPHIS, TENN.—The Harris Iron & Supply Co. has had plans prepared and work will start shortly on the erection of a 108 x 200-foot warehouse on South Front street and Linden avenue. The estimated cost of construction is $20,000.

HENRIETTA, OKLA.—Citizens will vote soon on a bond issue of $185,000 for a municipal street railway eight miles long. James Liggett is interested.

WESTERN STATES

MITCHELL, S. D.—South Dakota Short Line Railway Co. has been incorporated with $2,000,000 capital stock to build an electric line from Mitchell to Pierre. G. W. Adams, Council Bluffs, Ia., is an incorporator.

WICHITA, KAS.—Schermuly Mfg. Co., manufacturer of disc sleds, and general founder, has purchased a site on the Missouri Pacific railroad tracks in Wichita and will erect a 2-story factory.

WHITEHALL, MONT.—A contract for the erection of water and sewer systems, previously noted, has been awarded to the Independent Contracting Co., Bozeman. Work will include 12,950 feet of watermains, 10, 8, 6 and 2-inch pipe, 7,970 feet of 12, 10 and 8-inch sewer pipe, a 100,000-gallon tank and tower. George E. Baker is the engineer in charge.

FORT BENTON, MONT.—The board of county commissioners of Choteau has decided to erect a 200-foot steel bridge, previously mentioned, over Teton river, south of Genou.

DENVER, COLO.—The Western Chemical Mfg. Co. is having plans prepared for a factory to cost $12,000.

HOLBROOK, ARIZ.—County commissioners will call a special election soon on issuing $68,000 in bonds for steel bridges.

BOISE, IDA.—Bids will be received until Oct. 22 by the commissioners of Ada and Owyhee counties at court house at Boise, for the erection of a 454-foot steel bridge over Snake river, Grandview valley. Plans are filed at office of county clerk at Boise or Silver City.

IDAHO FALLS, IDA.—James McMillan has applied for a franchise to install gas heating and lighting and power system.

TWIN FALLS, IDA.—County commissioners have passed a resolution calling for the construction of a rim to rim bridge over the Snake river, north of Hansen, and a second at Shoshene Falls. The estimated cost of construction is $60,000.

WALLACE, IDA.—The O'Connor Universal Locknut Co. has been incorporated; $100,000 capital stock; by C. D. O'Connor, J. D. Foster and R. E. Weniger. The company plans to build a plant.

AUBURN, WASH.—Rotary Valveless Motor Co., recently incorporated with $100,000 capital stock, by J. O. Menard and others, will build a factory for the manufacture of its specialty.

BELLINGHAM, WASH. — Erg Automatic Lock Co. has been incorporated; $30,000 capital stock; by George Erg, O. Lobe and W. R. Brown.

PENDLETON, ORE.—The Clements Mfg. Co. will build a factory to manufacture hand and power vacuum cleaning plants. A. S. Kedzie, manager.

PORTLAND, ORE.—Phoenix Iron Works will rebuild its plant recently damaged by fire.

SPOKANE, WASH.—Plans have been completed for a 192-foot steel bridge at Howard street costing $25,000 and an addition to the Monroe street bridge costing $27,500.

Eight Pertinent Suggestions of Particular Value

The Mead-Morrison Mfg. Co., East Boston, plans the erection of a plant in Gloucester, Mass., to be used for the manufacture of steel forgings. It will be equipped with heavy forging presses and boilers.

The American Brake Shoe & Foundry Co., Mahwah, N. J., is inquiring for lathes and other equipment for the manufacture of shells of large diameter.

An inquiry has been issued by the American Locomotive Co., 30 Church street, New York City, for considerable shrapnel making equipment.

The Allegheny Steel Co., Brackenridge, Pa., is installing special equipment for the manufacture of brass shell cases.

The Prairie Power Co., Prairie City, Ore., is having plans prepared for a hydro-electric power plant to be erected on the John Day river. Equipment will include a water wheel and generator together with 14 miles of transmission line to Prairie City.

Manistee Iron Works, Manistee, Mich., has had plans prepared for a cupola room 30 x 32 feet and a core oven room 20 x 30 feet. Electrically driven machinery, a crane and a blower will be installed.

The city of Perry, Ia., is in the market for a high-duty pump for installation in the municipal water works. Adrian Cross is city clerk.

The water works and sewerage disposal board of the city of Clarksburg, W. Va., will receive bids for two gas engines and pumps to be installed in the city water works.

IRON AND STEEL PRICES

Corrected up to Tuesday noon

PIG IRON

(Delivery to Dec. 31.)

Bessemer, valley	$16.00
Bessemer, Pittsburgh	16.95
Basic, Pittsburgh	15.95
Basic, eastern Pa.	17.50
Malleable, Pittsburgh	15.45 to 15.95
Malleable, first half, Pbgh.	15.95
Malleable foundry, Chicago	15.00
Malleable foundry, Philadelphia	16.75 to 17.25
Malleable foundry, Buffalo	15.50 to 16.00
No. 1X foundry, Philadelphia	16.75 to 17.00
No. 2 foundry, Pittsburgh	15.45 to 15.95
No. 2 Fdy., first half, Pbgh.	15.95
No. 2 foundry, first half, valley	15.00
No. 2 foundry, Cleveland	15.00 to 15.30
No. 2 foundry, Ironton	14.50 to 15.00
No. 2 foundry, Chicago	14.25
No. 2X foundry, Philadelphia	16.25 to 16.75
No. 2X fdy., N. J. tidewater	16.25 to 16.75
No. 2X foundry, Buffalo	15.50 to 16.00
No. 2 plain, Philadelphia	15.50 to 15.75
No. 2 plain, N. J. tidewater	15.75 to 16.25
No. 2 plain, Buffalo	15.25 to 15.50
No. 2 southern, Birmingham	11.50 to 12.50
No. 2 southern, Cincinnati	14.40 to 15.40
No. 2 southern, Chicago	15.50 to 16.00
No. 2 southern, Phila. delivery	15.50 to 16.00
No. 2 southern, Cleveland	15.50 to 16.00
No. 2 south'n, New York docks	15.50 to 16.00
No. 2 southern Boston, docks	15.75 to 16.25
No. 2 south. interior, New Eng.	16.50 to 17.50
No. 2 southern, St. Louis	15.90
Virginia No. 2X furnace	13.50 to 14.00
Virginia 2X, Philadelphia	16.25 to 16.75
Virginia 2X, Jersey City	16.60 to 17.10
Virginia 2X, Boston points	16.75 to 17.25
Gray forge, eastern Pa.	15.50 to 15.75
Gray forge, Pittsburgh	14.95 to 15.20
Gray forge, first half, Pbgh.	15.20
Gray forge, Birmingham	10.00
Silveries, 8 per cent, Jackson, O.	18.00 to 18.50
Silveries, 5 per cent Birmingham	13.00
Silveries, 8 per cent, Chicago	20.00 to 20.50
Standard low phos., Phila.	26.00 to 27.00
Lebanon low phos., furnace	23.00 to 24.00
Low phos., Pittsburgh	25.50 to 26.00
Charcoal, Lake Superior, Chgo., Nos. 1 to 4	16.25 to 16.75
Charcoal, Buffalo	16.75 to 18.25
Charcoal, Birmingham	21.50

IRON ORE

Lake Superior Ores.
(Lower lake ports.)

Old range Bessemer, 55 per cent.	$3.75
Mesabi Bessemer, 55 per cent.	3.45
Old range, non-Bess., 51½ per cent.	3.00
Mesabi non-Bessemer, 51½ per cent.	2.80

Foreign Ores.
(Per unit Philadelphia.)
(Prices nominal.)

Foreign Bess., 50 to 65 per cent.	8 to 8½
For'n non-Bes., 50 to 65 per cent.	8 to 8½

COKE

(At the ovens.)

Connellsville furnace	$1.80 to 2.00
Connellsville fur., Nov. and Dec.	2.25
Connellsville foundry	2.30 to 2.60
Connellsville fdy. contr.	2.40 to 2.70
Wise county furnace	2.00 to 2.25
Wise county foundry	2.40 to 2.60
Pocahontas furnace	2.00 to 2.50
Pocahontas foundry	2.25 to 2.50
New River, foundry	2.50 to 3.25
New River, furnace	2.25 to 2.50

FERRO ALLOYS AND STEEL MAKING METALS

Ferro mang., furnace (prompt)	110 to 115
Ferro mang., Balti. (future)	100.00
Spiegeleisen 20 per cent, furnace	28.00
Ferro-silicon, 50 per cent, Pbgh.	73.00 to 75.00
Ferro-silicon, 50 per cent, Phila.	73.00 to 75.00

Bessemer ferro-silicon, 9 per cent to 10 per cent, $20.00; 10 to 11 per cent, $21.00; 11 to 12 per cent, $22.00; 12 to 13 per cent, $23.00 a ton at the furnace at Ashland, Jackson and New Straitsville, O.

Ferro-chrome, 4 to 6 per cent carbon, 20 cents per pound; 2 per cent carbon, 40 cents per pound, delivered.

Ferro-vanadium, $2 25 to $2.30 per pound of contained alloy, Pittsburgh.

Ferro-carbon titanium, 8 to 12½ cents per pound in carloads.

Nickel, 50 to 55 cents per pound.

Freight Rates via Panama Canal

Rates on finished materials, including plates, shapes, bars, wire, nails, etc., to Pacific coast points via Panama canal, per 100 lbs., in carload lots, exclusive of insurance and dockage.

From New York	$0.40
From Pittsburgh	.619
From Youngstown	.619
From Niles	.619
From Wheeling	.619
From Steubenville	.619
From Johnstown	.604
From Coatesville	.545
From Steelton	.555
From Bethlehem	.529
From Cleveland	.65
From Chicago	.765

Ferro-tungsten, nominal, at $3 to $3.50 per pound of contained alloy.

Cobalt metal, $1.60 to $1.75 per pound, Pittsburgh.

Aluminum, 55 cents per pound, New York.

Ferro-molybdenum, Pittsburgh, nominal.

SEMI-FINISHED STEEL

Open hearth billets, Phila.	$30.00 to 32.00
Forging billets, Phila.	34.00 to 38.00
Forging billets, Pbgh.	31.00 to 35.00
Forging billets, Chgo.	32.00
Wire rods, Pittsburgh	30.00
Bess. bill., Youngstown	24.00 to 25.00
Open hearth billets, Youngstown	25.00 to 26.00
Bessemer billets, Pittsburgh	25.00
Open hearth billets, Pittsburgh	26.00
Bess. sheet bars, Youngstown	24.00 to 25.00
Op. h'th sheet bars, Youngstown	25.00 to 26.00
Bess. sheet bars, Pittsburgh	25.00 to 26.00
Op. h'th sh. bars, Pbgh.	26.00 to 26.50
Muck bar, Pittsburgh	28.00

RAILS AND TRACK MATERIAL

Stand. Bess., rails, Pbgh. & Chg.	1.25c
Stand. op-h'th rails, Pbg. & Chg.	1.34c
Light rails 8 to 10 lbs. Pbgh.	1.40c
Light rails 8 lb. Chgo.	1.31c
Light rails 12 to 14 lbs. Pbgh.	1.35c
Light rails 12 lbs. Chgo.	1.26c
Light rails 16 to 20 lbs. Pbgh.	1.30c
Light rails 16 to 20 lbs., Chgo.	1.21c
Light rails 25 to 45 lbs. Pbgh.	1.25c
Light rails 25 to 45 lbs. Chgo.	1.16c
Relaying rails, standard, Pbg. & Chgo.	$23.00 to 24.00
Relaying rails, light, Chgo.	21.50 to 22.50
Angle bars, st. sect. Pbgh. base.	1.50c to 1.75c
Angle bars, st. sections, Chicago	1.50c to 1.75c
Spikes, railroad, Pbgh.	1.60c
Spikes, railroad, Chgo.	1.65c to 1.75c
Track bolts, Pbgh.	2.10c to 2.25c
Track bolts, Chgo.	2.10c to 2.25c
Tie plates, Chgo.	30.00 to 32.00

Freight Rates, Pig Iron

Mahoning and Shenango valleys to:—

Cleveland	$0.95
Newark, N. J.	2.98
Boston	3.18
Philadelphia	2.78
Pittsburgh	.95
St. Louis	3.18

Buffalo to:—

Albany, N. Y.	$1.26
New England (all rail)	2.58
New York and Brooklyn (all rail)	2.58
New York and Brooklyn (by canal)	1.25 to 1.60

Virginia furnaces to:—

Boston docks (r. and w.)	$3.05
New England (all rail)	3.25
New York dock (r. and w.)	2.88

Birmingham, Ala., to:—

Cincinnati	$2.90
Chicago	4.00
Cleveland	4.00
Louisville, Ky.	2.65
New York (all rail)	6.15
New York (rail and water)	4.25
Philadelphia (all rail)	5.20
Philadelphia (rail and water)	4.00
Pittsburgh	4.90
Savannah, Ga.	2.75

Chicago, to:—

Des Moines	$2.80
Milwaukee	.50
Moline, Ill.	1.40
Omaha	3.58
St. Louis	1.58

Ironton and Jackson, O., to:—

Chicago	$2.54
Cincinnati	1.26
Cleveland	1.62
Detroit	1.81
Indianapolis	1.58

SHAPES, PLATES AND BARS

Structural shapes, Pittsburgh	1.40c to 1.50c
Structural shapes, Chgo.	1.59c
Structural shapes, Philadelphia	1.559c to 1.659c
Structural shapes, New York	1.559c to 1.619c
Struc. shapes, San Francisco	2.00c to 2.05c
Tank plates, Chgo.	1.54c to 1.59c
Tank plates, Pittsburgh	1.40c to 1.50c
Tank plates, Philadelphia	1.509c to 1.559c
Tank plates, New York	1.519c to 1.569c
Bars, soft steel, Pittsburgh	1.40c to 1.50c
Bars, soft steel, Chicago	1.59c
Bars, soft steel, Philadelphia	1.559c
Bars, soft steel, New York	1.569c
Hoops, carloads, Pittsburgh	1.50c
Bands, Pittsburgh	1.40c
Shafting, Pbg., contr. car loads.	60 to 62 off
Bar iron, Chgo.	1.35c
Bar iron, Philadelphia	1.459c to 1.509c
Bar iron, New York	1.469c to 1.519c
Bar iron, Cleveland	1.35c to 1.40c
Bar iron, Pittsburgh	1.45c to 1.50c
Hard steel bars, Chicago	1.30c to 1.35c
Smooth fin., mchy. steel, Chi.	1.68c

SHEETS AND TIN PLATE

No. 28, black, Pittsburgh	2.00c
No. 28, black, Chgo.	2.19c to 2.29c
No. 28, tin mill, black, Pbgh.	1.95c
No. 28, galvanized, Pbgh. nom.	3.50c to 3.75c
No. 28, galvanized, Chgo.	3.79c
No. 10, blue anld., Pbgh.	1.60c
No. 10, blue, annealed, Phila.	1.759c to 1.809c
Tin plate, 100 lb., coke base.	3.10c to 3.20c

EXTRAS FOR SHEET OR TIN MILL SPECIFICATIONS

(Per hundred pounds.)

Single pickled, cold roll, and re-anl.	30 cents
Hot roll'd pick'd and anl., tin mill	25 cents
Full pickl'd, cold rolled and re-anl.	50 cents
Auto sheets	75 cents
Blued stove pipe stock	10 cents
Range steel	30 cents
Re-squaring	10 cents
Roller leveling	10 cents
Patent leveling and re-squaring	35 cents
Oiling sheets	10 cents
Deoxiding	10 cents
Lime finish	10 cents
Open-hearth stamping steel, free fr. mill scale	55 cents
Special open hearth deep stpg. steel free from mill scale	80 cents
Extra deep special auto body stock	$1.25
Ext. for 28 gage ov. 32 to 36-in. wide	10 cents

No reduction for sheets not annealed.

The above extras apply on both sheet and tin mill specifications, at the same rate.

IRON AND STEEL PIPE

(Pittsburgh.)

	Black.	Galv.
	Butt-weld.	
Steel, ¾ to 3 inches	79	63½
Iron, ¾ to 2½ inches	71	52
	Lap-weld.	
Steel, 2½ to 6 inches	78	62½

BOILER TUBES

Steel, 3½ to 4½ inches l. c. l.	71
Iron, 3½ to 4½ inches l. c. l.	59

WIRE PRODUCTS

(Retailers' price 5 cents above jobbers' quotation.)

Wire nail jobbers, Pittsburgh	$1.75
Plain wire, jobbers, Pittsburgh	1.60
Galvanized wire, jobbers, Pbgh.	2.30
Polished staples, Pbgh.	1.90
Galvanized staples, Pbgh.	2.60
Barb wire, painted, jobbers, Pbgh.	1.90
Barb wire, galv., jobbers, Pbgh.	2.60